AMERICAN GAS ASSOCIATION MONTHLY

Vol. IV No. 6

JUNE, 1922

IT might be profitable for our people to get a somewhat clearer perspective of our own and the world's troubles and problems. Even a superficial survey must bring us out of an atmosphere of gloomy introspection into an assuring realization that, great as our dislocation may seem to be, we relatively are in an enviable position. Our nation is unshaken and as a people we are getting our bearings in a world of perplexing economic adjustments. While there is unemployment and lack of profit taking, we are free of panic. We are comparatively more restless than injured.

—HERBERT HOOVER.

June 1, 1922

DEAR MR. GAS ENGINEER:

Right at the beginning of the Monthly we are addressing this message particularly to you because we want you and every other gas engineer to know that the

AMERICAN GAS ASSOCIATION

GAS CHEMISTS HANDBOOK

(1922 Edition)

is available for distribution at $6.00 per copy.

This was first announced in the March issue of the Monthly and by personal letter to all gas companies in the United States and to date

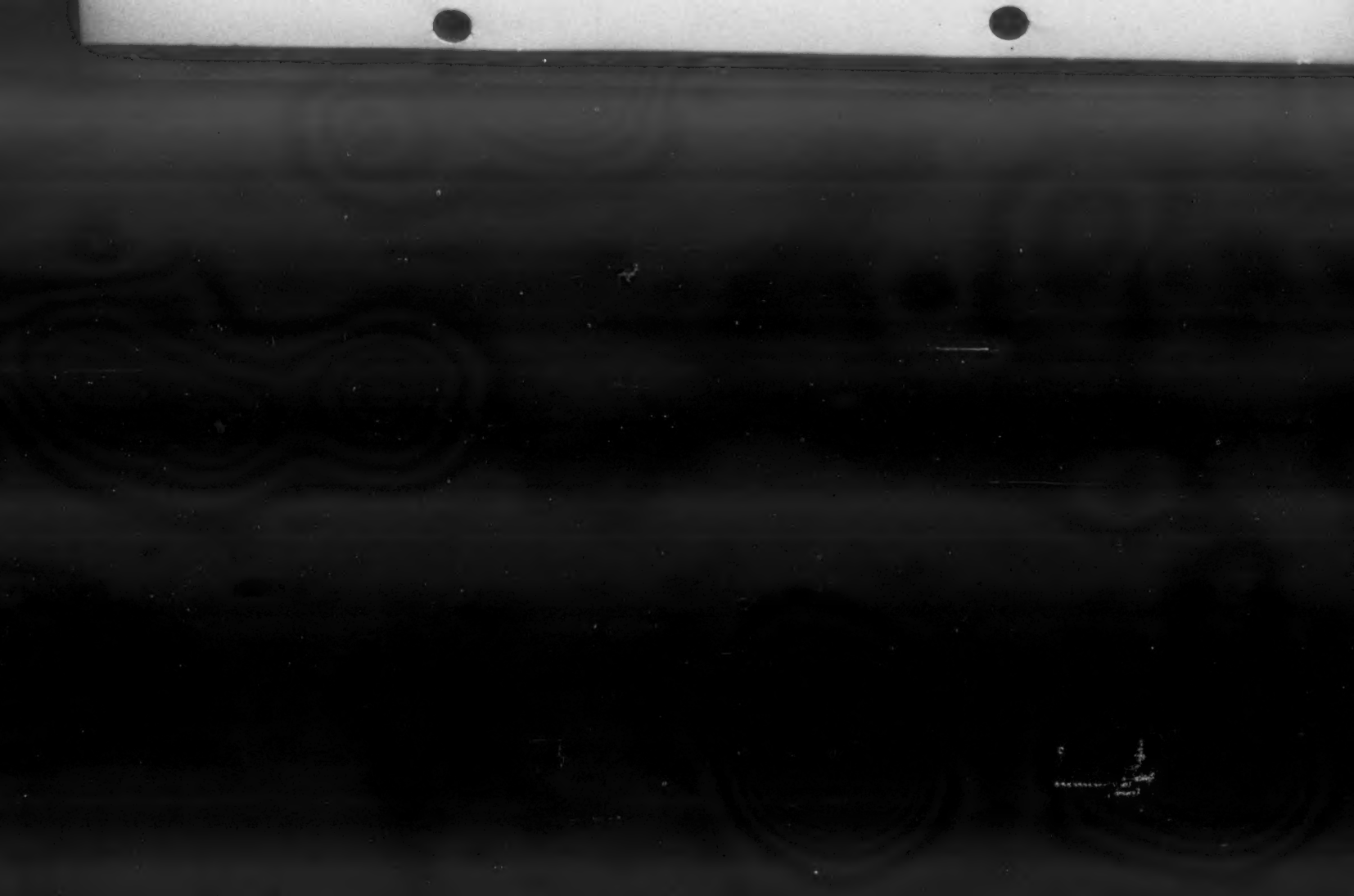
375 GAS CHEMISTS HANDBOOKS

have been sold.

But, we are still receiving letters from Gas Engineers asking when the revised edition of the Handbook will be available. This means we are not reaching all the people who need the Handbook and we want to say right here that the Handbook is not only a necessity in the laboratory but an essential adjunct to the technical library of any Gas Engineer. Send your order to Association Headquarters.

GAS CHEMISTS HANDBOOK

FIRST EDITION—1916	SECOND EDITION—1922
345 Pages, 9 x 6	608 Pages, 9 x 6
12 Tables	31 Tables
73 Illustrations	113 Illustrations
9 Page Subject Index	22 Page Subject Index
11 Authors & Collaborators	29 Authors & Collaborators



C O N T E N T S

VOLUME IV JUNE, 1922 NUMBER 6

Abstracts of Technical Articles 372
Affiliated Associations 362
Book Worthy of Recommendation, A 347
Bread Baking with Gas 361
Chicago Gets Under Way 358
Classified Directory—Manufacturers of Gas Equipment 375
Commissioner Brundige on Advertising 343
Converting Coal Heating Boilers to Gas 323
Cooperage Industry, The 359
Correction 352
Cost Accounting for Gas Plant Construction 339
Depreciation Charges of Railroads and Public Utilities 333
Employment of College Students during the Summer Months 331
Error in Standard Specifications 338
Gas Appliance Statistics 349
Gas Big Feature of New York Show 351
House to House Selling of Water Heaters 353
New Members 326
Notes on Investigations of Bureau of Mines 332
Opportunity 322
Playing One Night Stands in Jersey 341
Progress of Accident Prevention in the Gas Industry, The 327
Publicity Happenings 345
Seventeen Reasons for Advertising 344
Typical Distribution Systems for Small Gas Plants 363
Water Heating Exhibits—Pennsylvania—New Jersey Association Meeting 348
What One Company is Doing on the Water Heating Drive 356
Wholesale Bread Baking With Gas 360

AUTHORS

Howard, A. C., "Typical Distribution Systems for Small Gas Plants" .. 363
Searle, R. M., "Seventeen Reasons for Advertising" 344
Smiley, W. E., "Cost Accounting for Gas Plant Construction" 339

FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

AMERICAN GAS ASSOCIATION MONTHLY
OFFICE OF PUBLICATION, BRATTLEBORO, VT.
SUBSCRIPTION RATE - *$5.00 PER YEAR*

Entered as Second Class Mail Matter at the Post Office at Brattleboro, Vermont, February 10th, 1922, under the Act of March 3, 1879.

American Gas Association Monthly

Vol. IV JUNE, 1922 No. 6

Opportunity!

Elsewhere in this issue appears the announcement of the desire of several colleges and universities to place some of their engineering students in the gas companies during the summer months. We want to say a few words about this.

There is an old saying about opportunity knocking but once at one's door and it strikes us that this indeed is her knock resounding throughout the home of the gas industry. If this be true, there are but two questions to be answered.

Will we open the door and greet her with open arms?

Will she ever knock again if there is no response?

Reason, judgment and expediency all urge us to answer the first question emphatically in the affirmative.

We believe that she will live up to the old saying if we do not.

Modern business is developing more and more along specialist lines. This is truly the age of the specialist. Realizing this, business is demanding men specially trained along the lines needed. In fact it has gone so far, that many organizations now only employ those who can show that they have been so trained. This means the college man since the colleges and universities have for some time been so fitting their students that they can meet these specialist demands of business. Therefore the requirement, in many cases, of the college diploma along with the application for work. Business has made this demand and the educational institutions are doing their best to equip their men accordingly.

Now, the gas industry has in its turn called upon them to provide special training in gas engineering and is finding them receptive to the idea as witnessed by the gas engineering courses to be inaugurated at the University of Illinois and at the Columbia University Summer School.

But in addition they ask us to place some of their students during the summer.

This is one of the most important and immediate results so far obtained. Here is a chance to show these institutions that we mean what we say—that we are willing to do our part in cooperation—that our cry for specially trained technical men is no mere passing whim. And furthermore, and of even greater importance, it is an opportunity to give these students a clear, lasting, interesting and first-hand knowledge of our great industry—knowledge that will convince them that it is a well worth while field for their future endeavors.

If we will not take these students on during their summer vacation, how can we make them believe that we will have places for them after they have finished a specialized course in gas engineering?

Don't let us fail to meet opportunity at the door with a welcome and a smile!

AMERICAN
GAS ASSOCIATION
MONTHLY

Vol. IV JUNE, 1922 No. 6

Converting Coal Heating Boilers to Gas

A VERY frequent question asked the American Gas Association office is one pertaining to the subject of converting all classes of coal fired house-heating boilers to gas. This question is presented to us from many different angles such as:

What is the best burner equipment to use?

Is it economical?

Does it give satisfaction?

In most cases all of these questions can be answered in the negative and if house heating, through a central plant which is to be fired by gas, is to be a continued activity of any gas company it will only be successfully accomplished when boilers designed throughout for gas firing are used.

The House Heating Committee of 1921 made a study of this subject and its chairman obtained statements from all his committee members of their experience with this problem in their various localities. Extracts from some of these statements are quoted herewith.

Denver, Colo.:

"It is our experience and opinion that the placing of gas burners in coal boilers and furnaces should be discouraged almost to the point of refusal to make such installations. In nearly every instance the consumer who can afford to pay the gas bill on such an inefficient installation can better afford to purchase in the first place a well designed, efficient, automatic gas fired boiler. From time to time we have made a number of such applications at the insistence of consumers but nearly always dissatisfaction develops and only one of these installations is still in use."

Baltimore, Md.:

"The subject of converting coal boilers to the use of gas by installing burners in the firebox will constantly be kept alive as long as gas is used for heating. This is due to the cheapness of converting coal boilers compared with installing gas designed boilers. It is only in extreme cases that the operating cost of a converted job will be as low as the opera-

tion of gas designed boilers or furnaces, and it is for this reason that gas companies should discourage them. Mechanically, the operation of converted equipment can be made as satisfactory as gas designed equipment, when the former is properly designed and installed, but should a gas company pursue a policy of installing such apparatus, the plumbers and steam fitters immediately follow suit and begin installing inferior burners in an improper manner and the gas company has a host of dissatisfied customers on its hands.

"The Baltimore Company formerly converted coal boilers and furnaces. We began by using ready-made burners such as are supplied by many firms in the natural gas regions and were very extensively used in these regions when natural gas was very cheap.

"Our attempts to apply these burners to artificial gas soon showed that burners designed for natural gas cannot give satisfactory results on artificial gas, especially if it is put under thermo control. It is almost sure to suffer from back firing. In Baltimore we very soon found that we could design better burners than we could buy. We also found that there was such an infinite variety of sizes and shapes of fireboxes among the furnaces we were called upon to convert that we gave up the attempt to use standard burners except for small round fireboxes, and built our own burners, using wrought iron pipe and designing each burner for its particular furnace. We converted over 200 boilers and furnaces, but for the last three years, have declined such business.

"It is impossible to expect plumbers to install good converted jobs, and unless a converted job is installed with the greatest care by experienced men, dissatisfaction will result and the gas company will lose some of the good will it is trying to build up."

Boston, Mass.:

"In regard to converting coal boilers into gas, your first sentence shows that many other companies have had our own experience in this direction. In my own case, I find that in spite of urgent advice to the contrary, customers and plumbers insist on carrying out experiments for themselves. I think it would be valuable, considering the number of times this question comes up, if, in addition to our warnings, we could give them small printed pamphlets, giving the experience of other companies as determined by actual cases, and advise about the dangers of such installations. I think that whereas customers are inclined to attribute our warnings to self interest or to a desire to sell gas apparatus, if we have such a pamphlet to give them, they would be less inclined to feel that our opinion was personal. Further, in this direction, it would be desirable to know just how far we could go toward restricting the use of gas in such cases. I am inclined to think that in our section we could prohibit its use. Here it would also be valuable to obtain the methods that other gas companies employ in securing the cooperation of the plumbers in this kind of an installation."

Portland, Ore.:

"Several years ago this subject was seriously considered from all possible angles. Certain tests made showed, as will be explained, that such a policy was not practicable from either an operating or construction standpoint.

"The usual solid-fuel hot air furnace is so designed that gas burner application, without numerous and costly changes, is almost impossible. Many different burners have been tried by ourselves and others with very little success. Different methods of bricking have also been experimented upon. All such combinations so far have proven unsatisfactory.

"Most gas furnaces are designed on the principle of a syphonic draft. This is believed essential in order that the full amount of heat may be absorbed by the furnace walls. Solid-fuel furnaces do not readily lend themselves to such changes, as the vent is generally taken from the top of furnace.

"Gas must be burned more efficiently than solid-fuel in order that it may be placed on competitive basis. In starting our heating campaign several years ago we were always careful to explain to prospective customers that their gas bills would average perhaps 20 per cent higher than for solid-fuel. Since that time, however, solid-fuel has increased so rapidly in price, that it is now possible to compete with certain kinds on an even basis.

"To obtain the best heating effect from a gas flame, either the tip of the flame must make contact with the object heated, or the fire travel must be of sufficient length and design to absorb nearly all heat from the combustion gases. Practically all solid fuel hot-air furnaces are built to absorb the radiant heat that is disseminated by a glowing bed of coals. To approach such a condition, brick cones, and other radiant elements were substituted which did not prove, for obvious reasons, to be economical.

"Very few solid fuel hot-air furnaces in the city of Portland have been converted to gas. Perhaps not over two or three such installations are to be found. These have been installed by the customers themselves and against our advice. It has been our policy at all times to discourage such installations. Such a stand is prompted largely by the element of economy. It is rather difficult to anticipate conditions where such practice would be considered good business, at present prices paid for house heating gas, unless it would be in a natural gas district where rates were exceptionally low."

New York, N. Y.:

"Several attempts have been made by both the gas company and local heating contractors to convert coal fired boilers to gas, but the result has always been questionable and in most cases absolutely unsatisfactory. The troubles encountered were as follows:

(a) In most cases the efficiency was so low that the operating cost was prohibitive.

(b) There was great difficulty in finding suitable burners for each type of fire box.

(c) In many cases it was impossible to burn the required amount of gas properly within the fire box space.

(d) For the sake of convenience and economy all gas boilers should be thermostatically controlled and unless the burners are of very good design this result will be difficult to secure without burner troubles.

All the experiences quoted above are quite emphatic in their convictions that converting coal fired house heating boilers to gas is not good business and will

never lead to the establishment of gas as a suitable fuel for house heating.

In most cities the price of gas is sufficiently high to be several times more expensive than coal on a straight fuel comparison. Gas can, therefore, never become a popular fuel for general house heating purposes unless every possible advantage is taken to make it the ideal automatic fuel as it properly deserves to be. Also, the boiler used must have the greatest possible efficiency still consistent with good service and simplicity of boiler construction.

The two principal reasons why converting coal fired house heating boilers to gas is unsatisfactory can concisely be stated to be:—

First, the nature of the heating surface of a coal boiler is such that the simple conversion by merely inserting gas burners will not produce an efficiency comparable with the best designed gas boilers.

Second, gas should never be used as the heating fuel in a central house heating plant unless it is thermostatically controlled. Thermostatic control means automatic operation, perfect comfort and minimum gas consumption, but most burners that are used for converting boilers come from the natural gas fields and are not suitable for automatic thermostatic control, without considerable danger of flashback. Even should gas companies build specially designed burners to take care of this objection, it would still be uneconomical due to the low efficiency which would be obtained on most cast iron coal fired heating boilers.

New Members

Gas Companies		
Clinton Gas & Electric Co.	F. W. Magdsick, G. Supt.	Clinton, Ill.
Wausau Gas Company	H. B. Hummell, Mgr.	Wausau, Wisc.
Capital City Gas Company	Geo. L. Blanchard, Treas.	Montpelier, Vt.
The Gas Light Co. of Waverly	O. L. Haverly, Treas.	Waverly, N. Y.
Manitowoc Gas Company	E. W. Galloway, Mgr.	Manitowoc, Wis.
Granite City Gas Light & Fuel Co.	Jos. E. McGraw, Sec.	Granite City, Ill.
North Platte Light & Power Co.	T. E. Roach, Sec.	North Platte, Nebr.
The Otero County Gas Company	Wm. A. Tobias, G. Mgr.	La Junta, Colo.
Springfield Gas Company	H. L. Baker, Treas.	Springfield, Vt.
The Key City Gas Company	Geo. McLean, Pres.	Dubuque, Iowa
Ocean County Gas Company	F. C. Berry, Mgr.	Toms River, N. J.
Beaver Dam Fuel & Light Co.	H. W. Johonnott, Mgr.	Beaver Dam, Wis.
Manufacturers		
The S. B. Sexton Stove & Mfg. Co.	W. Elbert Sexton, Pres.	Baltimore, Md.
Williams Radiator Company	G. M. Williams, Sec.	St. Louis, Mo.
The Fuller-Warren Company	C. McCullough, Sec.	Milwaukee, Wis.
Brunner Stove Company	Charles C. Brunner, Pres.	New York, N. Y.
Howard Stove Company	Hepburn Walker, Pres.	Beaver Falls, Pa.
The Gem Clay Forming Company	B. H. Greene, Vice-Pres.	Sebring, Ohio.

GENERAL

CHAIRMEN OF GENERAL COMMITTEES ORGANIZED TO DATE

Accident Prevention—CHARLES B. SCOTT, Chicago, Ill.
Amendments to Constitution—WM. J. CLARK, Mt. Vernon, N. Y.
American Engineering Standards Committee, Representative on—A. H. HALL, New York, N. Y.—(Alternate Representative) W. J. SERRILL, Philadelphia, Pa.
Award of Beal Medal—D. D. BARNUM, Boston, Mass.
Calorific Standards—J. B. KLUMPP, Philadelphia, Pa.
Chamber of Commerce, Membership in—CHARLES A. MUNROE, Chicago, Ill., National Councillor.
Cooperation with Educational Institutions—F. C. WEBER, New York, N. Y.
Finance—E. H. ROSENQUEST, New York, N. Y.
Gas Safety Code—W. R. ADDICKS, New York, N. Y.—(Alternate Representative) DONALD MCDONALD, New York, N. Y.
National Fire Protection Association—W. R. ADDICKS, New York, N. Y.
Rate Fundamentals—R. A. CARTER, New York, N. Y.
Rate Structure—J. D. SHATTUCK, Chester, Pa.
Standard Gas Appliance Specifications—W. T. RASCH, New York, N. Y.
United States National Committee of the International Commission on Illumination, Representative on—HOWARD LYON, Gloucester, N. J.
Nominating—A. P. Lathrop, New York, N. Y.

The Progress of Accident Prevention in the Gas Industry

THE safety work and accident prevention of this great industry has kept progress and in step with the advancement and development of safety work. The activities in this business have been centered in the organization of the American Gas Association, through its Accident Prevention Committee.

Headed by Mr. Charles B. Scott, General Manager, Bureau of Safety, Chicago, Illinois, this committee has been selected so that it is geographically distributed over the entire United States. Due to this fact, it has its fingers at the pulse of the gas industry in every locality and performs its duties more completely than any like body in the business world.

The personnel of the committee is as follows:

Chairman—Mr. Charles B. Scott, Manager, Bureau of Safety, Chicago, Ill.
Secretary—Mr. W. G. Rudd, Assistant Operating Engineer, The Peoples Gas Light & Coke Company, Chicago, Ill.

Mr. D. F. Burritt, Gas Engineer, Middle West Utilities Co., Chicago, Ill.

Mr. Edward Dobbin, Safety Engineer, Empire Gas and Electric Company, Geneva, N. Y.

Mr. Fred Fisher, Supervisor of Safety, Rochester Gas & Electric Corporation, Rochester, N. Y.

Mr. Thomas F. Holden, Superintendent of Works, Georgetown Gas Company, Washington, D. C.

Mr. George M. Kirschmer, Claim Agent, The Brooklyn Union Gas Co., Brooklyn, N. Y.

Mr. J. P. Pulliam, Vice-President, Wisconsin Public Service Co., Milwaukee, Wisconsin.

Mr. F. D. Shaffer, Vice President & General Manager, Chickasha Gas & Electric Company, Chickasha, Oklahoma.

Mr. F. A. Tewksbury, Supervisor of Safety, Denver Gas & Electric Company, Denver, Colo.

Mr. A. J. Van Brunt, Director of Safety Education, Public Service Corporation of New Jersey, Newark, N. J.

The meetings of the Accident Prevention Committee throughout the year are held in different sections of the country, and at these meetings the managers, superintendents, and safety engineers or supervisors of the various gas companies in each locality are invited to attend.

This novel idea has met with instant success, resulting in increased attendance and interest, and has the additional advantage that the executives in one section of the country come in contact with those of another, and thereby the exchange of views is helpful to the industry as a whole, both in the conduct of accident prevention work and in the actual operation of their plants. Meetings have been held in the past year at Rochester, New York; Atlanta, Georgia; Chicago, Illinois; Washington, D. C.; Rochester, New York; and Denver, Colorado.

Round Table Established

In accordance with the plan of keeping the interest progressing in safety work, this Accident Prevention Committee has established a round table of information for the various members of the gas industry. Not only does this apply purely to accident prevention or safety work, but due to the high caliber and excellent technical ability of the members of this committee, problems that have a direct bearing on the operating end of the business in connection with the safety work, are very readily and easily handled. The members of the American Gas Association are requested and asked to submit their problems to the committee for solution.

The committee, in turn, gladly and willingly disseminates the information that comes to hand from all sources through the medium of the various technical and association journals, and serves as an advisory board to the Executive Committee of the American Gas Association, and the industry as a whole. That this service is used and appreciated has resulted in interesting and timely advice given to gas companies from Maine to California, from Wisconsin to Texas.

Fundamental Safety Rules

The very important undertaking which the Accident Prevention Committee has now under way is the writing of a brief, concise set of "Safety Rules to be Enforced in the Operation of a Gas Plant" for the assistance and guidance of gas companies. This set of safety rules is not unwieldy, but represents the fundamentals in the operation and conduct of the gas business as seen by the members of the committee through their long years of actual experience, both in operation and in the prevention of accidents.

Supervision of Gas Masks

The Accident Prevention Committee met its responsibility squarely and stood in the path of all new and untried gas masks until they had proven satisfactory and passed the experimental stage. Numerous demonstrations were held before the committee in session, because the manufacturers readily foresaw that without the approval of this committee the industry, as a whole, could not be expected to support their products.

Due to the fact that there was a flood of army gas masks throughout the United States for the past two years, as an aftermath of the war, and also that these masks were being used for all kinds of gas, including city gas, a great number of serious accidents resulted from their improper use. Coming most commonly in contact with city gas, it was only the natural result that the gas companies would sooner or later bear the greater share of these accidents.

The American Gas Association through its Accident Prevention Committee, foresaw this great danger, and through the press and through its members, used

every means possible to explain the danger of asphyxiation from the use of the army gas masks. Repeated warnings were sent out that the army gas mask was for use only against bromine and chlorine gases.

Great Achievement—Research Work on Gas Asphyxiation

The greatest development in the gas industry along accident prevention lines for the past few years has been the establishment of research work to determine causes and effects of gas asphyxiation, and better means and methods of preventing same or hastening recovery from its effects. This work not only bears directly on the gas industry, but its interest is felt in every other line of industry that might work in conjunction with the gas industry, as well as to the general public at large. Its effect is far-reaching, and constitutes one of the most progressive movements that has been instituted in safety work.

Through the efforts of the Chairman, his secretary, and the members of the committee, the matter of making an appropriation of $5,000.00 to carry on research work for the benefit of the gas industry in the matter of gas asphyxiation, was laid before the Board of Directors of the American Gas Association. Mr. Charles A. Munroe, Vice President of the Peoples Gas Light and Coke Company, who last year was President of the Association, lent every assistance possible, and largely through his efforts the appropriation was granted by the Association.

After the above appropriation was guaranteed by the Association, Mr. Scott immediately set out to obtain the services of a number of eminent physiologists to serve as a commission for research on resuscitation from carbon monoxide poisoning, and after considerable difficulty we believe a body of the most eminent physiologists in the United States was appointed on the commission.

The personnel of the Resuscitation Commission of the American Gas Association is as follows:

Dr. David L. Edsall, Dean of Harvard Medical School, and Professor of Clinical Medicine, Harvard Medical School.
Dr. Walter B. Cannon, Professor of Physiology, Harvard Medical School.
Dr. Cecil K. Drinker, Associate Professor of Applied Physiology, Harvard Medical School
Dr. H. W. Haggard, Instructor in Physiology, Yale University.
Dr. Lawrence J. Henderson, Professor of Biological Chemistry, Harvard University.
Dr. Yandell Henderson, Professor of Physiology, Yale University.
Dr. W. K. Lewis, Professor of Chemical Engineering, Massachusetts Institute of Technology.
Dr. Charles B. Scott, Bureau of Safety, American Gas Association.

Actual tests in the field and in the laboratory have been conducted during the past year.

The field tests were conducted in the city of New York, and the Consolidated Gas Company of New York has co-operated by allowing the use of its emergency wagons and crews, and providing a room and transportation for the medical observer. The Commissioner of Health of New York City, Dr. Royal S. Copeland, has given the investigation his approval and support, and is rendering every assistance possible at all hospitals and particularly Bellevue. The U. S. Bureau of Mines has contributed the services of Dr. Stuart Scott, who is immediately notified of all gas cases and for which the emergency wagon is requested. Each emergency wagon is supplied with an inhaler, and also with the necessary equipment for taking a drop

of blood from the victim before the inhaler is used.

Laboratory experiments show that up to a half-hour after being gassed, respiration and breathing is very much depressed. Analysis of sample of blood shows that during this time very little gas was eliminated. While the results as outlined represent the preliminary investigations of this Reseach Committee and the determinations have not reached completion, this unlooked for discovery has opened up a new and original development that bids to be of great asistance to the gas industry.

Elimination of carbon monoxide was not very greatly increased by the use of oxygen since it was poorly inhaled. When about 8% of carbon dioxide was added to the oxygen, the volume of breathing was stimulated 200 to 300%. Oxygen then rapidly displaced the carbon monoxide from the blood

Up to the present time investigation showed that from 20 to 30 per cent of asphyxiation cases coming under the observation of the Research Committee, effective treatment may result in saving life, in hastening recovery, and diminishing the injurious consequences. The oxygen—carbon dioxide inhalation—virtually precludes any possibility of secondary respiratory failure and may fairly be regarded as distinctly increasing the patient's chances of escaping serious nervous or other degeneration, sometimes following gassing.

It would be only fitting to record the recommendations of this progressive committee to the gas industry, through the American Gas Association, for the intelligent carrying-on of accident prevention work, to employes and the general public.

"Adoption of recommended plans of organization by the individual gas companies. The adoption, enforcement and observance by employees of fundamental safety rules. The keeping of proper accident statistics, the careful investigation of all serious and fatal accidents, and the fixing of responsibility therefor. The speedy determination of the most effective means or device for resuscitation from gas asphyxiation. The careful training of all employes in the Schaeffer or Prone Pressure Method of Resuscitation."

The committee recommends the organization of Safety Councils in the gas industry regardless of the size of the company. It stands ready to serve any plant, giving them exact details of how to organize safety councils and to carry on its work to the best advantage.

Nothing but harmony, honesty, industry and frugality are necessary to make us a great and happy nation.

George Washington

Employment of College Students During the Summer Months

THE Committee on Cooperation with Educational Institutions is endeav- W. Odell, fuel engineer of the United States Bureau of Mines, in Technitry in the gas industry. Their thought is that, by showing these students the attractiveness of this field of work, they can stimulate a demand on the student's part for adequate courses in gas engineering which, in time, would result in securing well-trained technical men for the industry.

Working along these lines, the Committee approached a selected number of colleges and universities to find out if any of their engineering students desired work in the gas companies during the summer months. The result was quite gratifying. The following institutions replied in the affirmative:—

Harvard University—H. J Hughes, Dean, Pierce Hall, Cambridge, Massachusetts.

University of Nebraska—Wm. L. De Haufre, Chairman, Mechanical Eng. Dept., Lincoln, Nebr.

Columbia University—Geo. B. Pegram, Dean, Columbia University, New York City.

Rensselaer Polytechnic Institute—Arthur M. Greene, Jr., Dept. Mech. Eng., Troy, New York.

Case School of Applied Science—A. W. Smith, Dept. of Chemistry, Cleveland, Ohio

Iowa State College—O. R. Sweeney, Chemical Eng. Dept., Ames,Iowa.

Georgia School of Technology—Dr. W. H. Emerson, Dean, Atlanta, Georgia.

Carnegie Institute of Technology—J. H. James, Dept. of Chemistry, Schenley Park, Pittsburgh, Pa.

It is important that every possible opportunity be given these students to secure a first hand impression of the gas business. If educational institutions are ever to be convinced that there is a real need for courses specifically designed to train men for the gas business, and if the students in these institutions are to be made to realize the advantages of entering our industry, the gas companies must cooperate to the fullest extent.

Communicate directly with these institutions and give employment to as many students as can consistently be taken on during their summer vacation.

Service is the supreme commitment of life. I would rejoice to acclaim the era of the Golden Rule and crown it with the autocracy of service.

—President Harding

Notes of Investigations of Bureau of Mines

MANY uses have been found for raw or dehydrated coal tar, states W. W. Odell, fuel engineer of the United States Bureau of Mines, in Technical Paper 268, just issued. In fact, these are so numerous that there is no longer an excuse for throwing tar away or disposing of it wastefully. Some of the uses for tar and preparations in which it is employed are as follows: Timber preserving, fuel, tarred felt, paint for stone, brickwork, and iron, road-construction material and road-dust settler, waterproofing compounds for cement and for roof paint, germicides, and miscellaneous special preparations.

In the physico-chemical study of sulphur in coke, being made by A. R. Powell, physical organic chemist, of the Bureau of Mines at Pittsburgh, Pa., experiments have been conducted on the study of the decomposition of calcium sulphide. It was found that, working with boiling water at 100 degrees, calcium sulphide is hydrolized very slowly, the rate being increased by the addition of magnesium oxide. Small-scale laboratory tests will be made on coke containing fairly pure calcium sulphide to discover if it is feasible for desulphurizing coke.

In a survey of the Salt Lake City smoke problem, engineers of the Bureau of Mines found that about 27 per cent of the smoke made in the city was from residences. As the most obvious way of eliminating the domestic smoke nuisance is to provide smokeless fuel for these consumers, the bureau conducted an investigation regarding the feasibility of establishing a local supply of coke to take care of domestic heating requirements. The bureau found that the installation of a by-product plant of sufficient size to supply the entire domestic demand of Salt Lake City for coke fuel is not economically feasible unless municipal legislation prohibiting the production of smoke is obtained. By education and legislation consumers must be induced to pay $3 more per ton for smokeless fuel than for the ordinary bituminous coal in order to make the carbonization plant a success, while the coke and by-products of a low temperature carbonization plant would probably find a readier market than those of a standard high temperature plant. Neither plant would be a commercial success without protective legislation.

A semi-experimental 100-ton plant should be able to operate with a smaller differential between the price of coal and coke due to more favorable disposal of the smaller volume of by-products. Future developments in the iron industry of the State and in the substitution of by-product ovens for the beehive ovens at Sunnyside, Utah, when conditions warrant the change, will make available a supply of the smaller sizes of coke for domestic use, but it is doubtful whether the entire domestic demand can be supplied in this manner at a sufficiently low price. No single solution for the domestic smoke nuisance appears available. Means which should be considered for alleviating the nuisance are

(Continued on page 371)

ACCOUNTING SECTION

EWALD HAASE, Chairman — J. W. HEINS, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1922

At Large

DAVIDSON, H. C., New York, N. Y.
DOERING, W. A., Boston, Mass.
LA WALL, H. J., Philadelphia, Pa.
LAWRENCE, JAMES, New York, N. Y.
MEYERS, W. J., New York, N. Y.
PETTES, W. H., Newark, N. J.
SAUER, W. A., Chicago, Ill.
SCHMIDT, JR., WM., Baltimore, Md.
SCOBELL, E. C., Rochester, N. Y.
SMART, BURTON, Portland, Me.
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WILSON, P. A., Philadelphia, Pa.

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DEAL, E. C., Springfield, Mo. (Missouri)
HAASE, EWALD, Milwaukee, Wis. (Wisconsin)
HOUGHTON, W. E., Los Angeles, Cal. (Pacific Coast)
HOY, CHAS. W., Glassboro, N. J. (New Jersey)
JAMES, F. M., Aurora, Ill. (Illinois)
McCABE, J. B., Dallas, Tex. (South Central)
NORTON, W. F., Nashua, N. H. (N. E. Gas Eng.)
PORTER, EDW., Philadelphia, Pa. (Pennsylvania)
SCOBELL, E. C., Rochester, N. Y. (Empire State G. & E.)
SHEARON, B. P., Hammond, Ind. (Indiana)
STOTHART, E. C., Charleston, S. C. (Southern)
SWANSON, J. K., Jackson, Mich. (Michigan)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Consumers Accounting—W. A. DOERING, Boston, Mass.
Continuous Inventory of Fixed Capital—H. C. DAVIDSON, New York, N. Y.
Fire Insurance Rates—P. A. WILSON, Philadelphia, Pa.
Nominating—W. H. PETTES, Newark, N. J.
Standard Classification of Accounts—W. J. MEYERS, New York, N. Y.
State Representative—W. A. SAUER, Chicago, Ill.

Depreciation Charges of Railroads and Public Utilities

In 1921, there was distributed to our Company members a memorandum filed with the Depreciation Section of the Bureau of Accounts of the Interstate Commerce Commission, entitled "Depreciation Charges of Railroads and Public Utilities" by Robert A. Carter, Chairman of the Committee on Rate Fundamentals of the American Gas Association and William L. Ransom of the New York Bar.

On March 10, 1922, a reprint of this memorandum was made with additional notes, and copies of this reprint can be obtained by our members on application to Association Headquarters.

The additional notes contained in the reprinted memorandum relate to the decision of the Supreme Court on March 6, 1922, affirming Judge Hand's decree in the New York Consolidated Gas Company's case, and for the information of our members these notes are reprinted herewith. [EDITOR'S NOTE.]

FOOT-NOTE PAGE 32

ON March 6, 1922, the Supreme Court of the United States unanimously affirmed Judge Hand's decree, without modification in respect of any of his findings. The opinion of the Court, read by Mr. Justice McReynolds, declared that *"The Master's Report and Opinion disclose careful and intelligent consideration of the whole matter."* It will be noted that the Special Master in this case was the same judicial officer whose discussion of the subject of "depreciation" in the *New York and Queens Gas Company* case, quoted on pages 26 to 31 hereof, ante, was contemporaneously before the Supreme Court in the case last mentioned. In his report and

opinion in the *Consolidated Gas Company* case, thus commended by the Supreme Court, the Special Master had also said:

"Reasons for Rejecting 'Present Reproduction Cost' and Claimed Deduction for 'Theoretical Depreciation.'

"In arriving at the value of the property necessarily used in the gas business of the complainant company, I have rejected the testimony and suggestions of the witnesses for the defendants that I ought to take the investment in the property, less a large amount for 'theoretical depreciation.' Much has been said and written on this subject, and I have read with interest the matter which has been called to my attention. I cannot escape the view that a property used for the service of the public in the operation of a public utility such as a gas company, if kept in good operating condition, must, in the nature of things, be worth to the public at least the amount honestly and reasonably put into the property. Nor can I escape the conclusion that any other method of arriving at the value of the property used in the public service must tend to unfairness, either to the consuming public or to the investors in the public utility corporation.

"Take the case under consideration: I have found that, starting with the value of the property as fixed and agreed upon in 1884 and the issuance of stock at par upon that basis, and adding to that sum the amounts expended from time to time in installing new apparatus and facilities in existing plants and constructing new plants and facilities, and then deducting therefrom the cost of the property withdrawn from service since 1884, there is actually and reasonably invested in property used in the gas business of the complainant no less than $71,054,351.14, exclusive of mobile or floating assets, commonly called working capital. The plant, machinery and equipment used in the gas business of the complainant company has been and is maintained in excellent operating condition; proper repairs, renewals and replacements have been made from time to time, and the same are now in as high a state of efficiency as if new. From every point of view which concerns or affects the consumers, the property for which this $71,054,351.14 was paid is rendering the same service today, and in some instances a little better service, than was contemplated or secured at the time the money was put in. Nevertheless, counsel for the defendants insistently urge that all return must now be withheld from a large part of that investment, and the amount of investment arbitrarily reduced, merely because some of the plants or some of the property in them have been in existence for some years. The complainant company, on the other hand, would find justification in the decisions of the Courts for a contention that the value of this property must be taken as of the present time and that I must fix this value upon the expert opinion as to the cost of reproducing the property as of the present time, in which event there would arise the question whether from such reproduction cost should be deducted the amount of any observable and actual deterioration or depreciation.

"As I have found, on the basis of the prices, rates of pay, and costs prevailing during the eight months beginning January 1, 1919, the cost of making and distributing gas has been such as to allow a very small, if any return, on even the

actual investment; and since September 1, 1919, the cost of making and distributing gas has been increased in a number of respects so that the fair inference is that the complainant company now finds itself without any return upon the investment. The conditions found by me have existed for more than a year last past, and to a lesser degree for at least a year before that time, and will continue for at least a considerable period of time, the end of which cannot now be forecast.

"Upon such a situation and such a prospect, I think that the complainant company has shown itself, clearly and beyond all reasonable doubt, entitled to relief from the statutory limitation on its rates, but that its rate of return should be calculated, not upon the present high reproduction cost of its property, with or without the deduction of observed or actual depreciation, in whatever manner computed, but upon the actual, reasonable investment in the property devoted to the service of the complainants' consumers. Taking the years as they come and go, of high construction cost and of low construction cost, the amount honestly and actually put into a plant and system of this character, represents a sum which fairly and reasonably should be taken as representing a minimum of its value to the public for use as a public utility. The only testimony offered before me to show the expenditure which would be necessary in order to put the plant, structures, machinery and equipment in condition substantially as good as when erected or installed, was that of Alten S. Miller, an engineer long familiar with these plants, now vice-president in charge of construction work for the Bartlett-Hayward Company of Baltimore. He testified that the outlay of approximately $322,000 for repairs, renewals and replacements would accomplish this result. For the reasons already reviewed ,I have not considered this sum, or any other, as a proper deduction from the above-stated value of property."

The portions of the Special Master's opinion in the *Consolidated Gas Company* case which we have italicized above were quoted with evident approval by the Supreme Court, in sustaining the findings of the Special Master and of Judge Hand in the District Court.

FOOT-NOTE PAGE 46

As illustrative of the flimsy basis on which "estimates" of "accrued theoretical depreciation" are predicated, and the lack of experience, qualifications, or sound definition, which characterize the efforts to accomplish this deduction from invested capital, the following is quoted from the brief in behalf of the complainant gas company before the United States Supreme Court, in Consolidated Gas Company vs. Newton. (See footnote on page 32, ante). The references are to the printed record in that case:

"Appellants' witness Bemis defined depreciation as follows (fol. 40753):

'The loss of service life. The loss in life or serviceableness, or life in service of a part or all of the property.'

"This definition could not be correct because loss of life cannot be deducted from value new. Furthermore, since ninety-five per cent of the units of plant and equipment are displaced because of obsolescence or inadequacy and not because of wear and tear, it is obvious that the service life of a new unit just installed is no greater than that of a well maintained corresponding unit which has been in service for many years. The 'serviceableness' of both is identical;

likewise their service value, though the amount invested in each may differ because of a change in price.

"Appellants' witness Maltbie defined depreciation as follows (fol. 39841):

'It is the decrease in worth or value due to all causes, such as wear and tear, decay, obsolescence and inadequacy.'

"He did not explain whether or not he distinguished 'worth' from 'value.' If he intended that by 'worth' he referred to physical qualities, and that by 'decrease of worth' he meant deterioration, that part of this definition is clear error, in a rate case, because physical quality cannot be deducted from value new, represented by an amount of money. Therefore we are concerned only with his definition of depreciation as 'decrease in value.'

"But an author or writer may begin by a neatly rounded definition and blithely forget it the next minute. It is necessary to examine the witness' testimony to find what he really means. Mr. Maltbie said (fol. 39,951):

'When you start out with anything there is a certain amount of service it will render, and it has value because it will render that service. Now, as time goes on, the amount of remaining service which that thing will render decreases as you go along, and consequently the value of that commodity or article, or plant, whatever it may be, decreases in value because the person who owns it has a shorter and shorter time to get service out of that plant, or anything.'

"As above indicated this is mere plausible casuistry.

"We shall discuss concretely on pages 435 to 447 the illustrations used by this witness and their fallacy.

"Appellants' witness Hine, who made the computations of alleged depreciation in the appellee's plant and equipment, defined depreciation as follows:

'Loss in worth or value due to all the causes, such as decay, wear and tear, obsolescence, inadequacy, and so forth' (fol. 40,157).

"By 'value,' he meant 'value for the purpose of rate regulation' (fol. 40,166), which is apparently any amount which some one wishes 'value' to be. He speaks of 'depreciated cost' (fol. 40,169), a nonsensical juxtaposition of words. As to this, Judge Hand said, on the argument, to appellants' counsel:

'You cannot go into depreciation and you cannot go into obsolescence and still keep the theory of cost, because if you do, this is a confusion of principle. * * * You are trying to eat your cake and have it; you are taking it with one hand and refusing to give with the other what the principle you invoke requires.'

"In making his estimate of depreciation, Hine did not consider the physical condition of the property (fols. 40,152, 40,129). He based his estimates wholly on the age of the property, although admitting that if he looked at two engines of different ages, he could not tell which was the older (fol. 40,290). To exhausters he attributed a life of from 15 to 25 years, but he never knew of an exhauster retired for age only (fol. 40,292). What he did, as a result of reading his whole testimony, was to assign a period of life to each plant unit, to ascertain its cost, as nearly as possible, and then to assume, without explanation, that the depreciation is equivalent to such a proportion of the cost as the expired life bears to the estimated life.

"Hine considered that the life of a unit began at the time any money was

spent for it and, in this manner, he estimated that one of the plants was three years old and had depreciated accordingly, before it was even completed and had begun to operate (fol. 40,183).

"In the case at bar, the Master and District Court have found as a fact that utility plants and property do not wear out, deteriorate, or lose value because of the progress of time. The Master and the Court have found as a fact that no such depreciation or deterioration has in fact taken place as to the appelee's plants and properties.

"Mr. A. S. Miller, vice-president of the Bartlett-Hayward Company, one of the most experienced construction engineers in the gas industry in the country, made a report of the results of his detailed examination into the condition of the appellee's plants and properties. He found them in a high state of repair and first-class operating condition. For the sum of $322,000 (or about ½ of 1 per cent of the investment) he was willing to take a contract to put the plants and property in substantially as good condition as when first erected or installed (Record, page 7620 et seq.).

"The items and details of his estimate were set out in his report, and this testimony as to the actual condition and the sum required for the restoration to condition new, was uncontradicted (Record, page 69a).

"Upon what testimony do the appellants ask this Court to overturn the fact-findings of the Court below? None of the appellants' witnesses took any account of the actual physical condition of the plants (fols. 40,152, 40,129):

"The witness Hine, in so far as his practical experience was concerned, had never risen above the grade of 'cadet engineer.' As we have seen (pages 363-365; 372-373, ante), he did not profess to have personal knowledge to sustain his judgment and opinion respecting the life expectancy of the various classes of plant and equipment. His 'life-tables' were mere guess-work or gathered from the conclusions of other persons as reckless regarding facts or as lacking in qualifications as was Hine himself. His formula was that of his partner Maltbie; beyond that he did not go and could not know.

"The witness Maltbie made no profession of being anything but an academician. He had never operated or managed any plant, property or project, or had experience in the administration of the financial affairs of any undertaking of any kind. His sole asset was his formula for computing a wholly theoretical depreciation based upon an absurd hypothesis of life expectancy. All he required was that some one should provide him with something which might be taken as the 'historical' cost if actual cost was too high for his purposes—of the plant and equipment he was hired to depreciate, and then he would sit in his library and apply his hypothetical formula, sustaining it by comparing a gas-plant (which will operate for centuries) to a wood-pile disappearing under daily removals (see pages 415 to 427, post).

"The Witness Bemis frankly admitted (Record, page 13,609) his utter lack of experience in the management and handling of analogous properties and projects. He, too, had only a theory and a formula.

"Whatever may have been the opinion of the Court in the Knoxville case as to the necessity of the creation of a depreciation reserve accumulating in amount pari passu with the expiration

of life of each plant unit, that opinion is controverted by the facts of the record in this case.

"The appellee has been in business since 1884. It has never had a depreciation reserve; it has never found one necessary (see testimony quoted on pages 461-70 post). Witnesses for the appellee testified that such a reserve as is contended for by the appellants is in fact unnecessary.

"Appellants' theories are contradicted by three basic facts of the industry, as appears from the testimony, viz.:

"(1) The plant and property of a well-maintained gas corporation, and of the appellee corporation in particular, does not, in fact, wear out, deteriorate or lose value by the progress of time.

Miller: Record, fol. 22,816, 23,030, 23,073, 23,117, 23,134, 23,155, 23,-242, 23,381, 23,397.

Mayer: Record fols. 21,312, 21,462, 21,958.

Allison: Record, fols. 24,485, 24,498, 24,513 to 24,536.

Simpson: Record, fols. 20,717, 20,-933.

Woods: Record, page 4762, et seq.

"The plants and properties of the appellee are in fact in high state of repair and first-class operating efficiency, yielding results as good or better than when the plants were first built.

Woods: Record, page 4752 et seq.

Miller: Record, page 7613.

Hine (witness for defendants): Record, pages 13,382, 13,387.

O'Connell (witness for defendants): Record, page 9,523.

"(2) The replacement of particular units (other than units which are replaced as 'repairs') is not caused by age, wear and tear, rust or rot, but by inadequacy, or by the appearance of new types of apparatus. The installation of apparatus of greater capacity results in economies in the cost per unit of service. The installation of new types of apparatus is brought about because they are more economical.

"(3) There is no basis on which to estimate the time at which apparatus will be replaced because of inadequacy or obsolescence, until such replacement is imminent.

(See Office Decision 1001, Bureau of Internal Revenue, page 21 of Bulletin 35, 1921.)"

Error in Standard Specifications

The attention of our members is called to the fact that on pages 36 and 38 of the revised edition of the Standard Specifications for Cast Iron Pipe and Special Castings, the printer has interchanged the cuts for service sleeves and split sleeves. The headings for these pages are correct but the cut now appearing on page 36 should have been shown on page 38 under the heading Split Sleeves and vice versa. Corrected copies of these pages will be forwarded to all purchasers of the revised edition of the Standard Specifications shortly so that the corrected pages can be pasted in the Specifications at the proper place.

Cost Accounting for Gas Plant Construction

W. E. SMILEY, Asst. Treas., Pittsburgh By-Product Coke Co., Pittsburgh, Pa.

THE subject of cost accounting of construction work on a modern gas plant is one that presents many and varied arguments.

The method of keeping account of the various units entering into the cost of construction of a modern gas plant is briefly summarized in the following outline.

The first and most important step in the system is to establish a Master Card of Accounts. This should be divided into seven divisions, as follows:

General
Plant Auxiliaries
Ovens
By-Product
Benzol
Producer
Water Gas

Under "General" the overhead, drafting, indirect erection expenses, temporary structures, operation of equipment, defective work and construction accidents are usually set forth.

"Plant Auxiliaries" cover roadways, sewers, boiler house, power stations, office and laboratory, water service stations and equipment with an account covering foundations for same. Practically this same procedure is carried throughout each division. In order to obtain the best results, this Card of Accounts should be uniform and flexible; that is to say where succession of the same class of work is repeated at different points, the sub-accounts should bear the same relation to the master account in each case.

As an illustration, let it be assumed that a By-Product Building, General Building, Boiler House and an Office Building are to be erected. The sub-accounts for each building would be as follows:

(a) Brickwork
(b) Structural Steel Work for Framing Platforms, etc.
(c) Roofing, Doors, Windows, Hardware, Plastering, Painting, etc.
(d) Floors of all kinds
(e) Heating
(f) Plumbing.

This same relation between sub-accounts should be carried out wherever similarity of work exists in other classes of installations.

In order to be flexible, the account numbers covering general expense and plant auxiliaries should be so allocated as to be readily used in conjunction with either class of installation without conflicting with the account numbers contained in any particular section. In order to eliminate such a possibility, the following numbers may be assigned to each of the seven divisions:

General	1-10
Plant Auxiliaries	10-70
Ovens	170-200
By-Product	270-300
Benzol	370-400
Producer	470-500
Water Gas	570-600

After thus having established the fundamental principle around which the entire system should revolve, let us now consider the application thereof in connection with the purchase of materials, the distribution of labor and the accounting for both of these in the home office.

After the design has been approved by the chief draftsman, a bill of material covering each drawing should be compiled. The account numbers affecting this material should be shown thereon and a work letter or requisition sent to the Purchasing Department.

Here the usual formality of obtaining bids and awarding of contracts should be observed.

A purchase order with many duplicates should be written showing the drawing number, with a brief description of same, the requisition number which has been the authority for purchase and the account or account numbers applicable to the material purchased. Copies of these orders should then be filed by the Purchasing, Estimating, Accounting and Field Office.

The invoices rendered against these orders should be approved by the Purchasing Department for prices and terms and returned to the Purchase Accounting Department.

This Accounting Department should then check the invoice against the respective orders, showing thereon the account numbers to which the material is chargeable, and mail copies of these invoices to the field, where they should again be checked and approved for receipt of the material.

The invoices should then be returned to the home office for payment.

The distribution of labor involves considerable detail, due to the varied classes of skilled and unskilled labor and the many different sections of the plant on which they are engaged during the day.

In order to get the very best results from such a condition, each foreman should be held responsible for the accounting of the work performed each day by the men under his charge.

Each morning the foreman should turn in reports on foreman's sheets, showing the check numbers of the men, description of the work in which they were engaged the day before, and the number of hours worked on each particular class of work.

These reports should then be sent to the Payroll Department and checked as to the total hours of each man, with the record of time compiled by the checker.

Upon this approval the foreman's sheets should then be turned over to the Cost Engineer who should place the proper charge account numbers on same, based on the description and his personal observation of the previous day.

The report will now be ready for extensions.

After these calculations have been made, a summary should be made according to the amount chargeable to each sub-account, and this summary should be balanced with the total of all foremen's sheets. After balancing, this should be posted to a payroll distribution sheet, according to the amount each day that is applicable to each account.

The length of time covered by this report will vary according to the labor rulings in various localities, but same should be designed as a bi-monthly return to the accounting department of field expenditures. Salaries of the Erecting Engineer and his assistants should be paid direct from the home office.

The Accounting Department should receive the Payroll distribution from the field Payroll Clerk and enter this in the General Cost records. The Purchase Accounting Department upon the return from the field of the copies of invoices

(Continued on page 384)

ADVERTISING SECTION

A. A. HIGGINS, Chairman — B. J. MULLANEY, Vice-Chairman

CHARLES W. PERSON, Secretary

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Playing "One-Night Stands" in Jersey

THE Public Service Corporation of New Jersey has recently held the first of a series of stockholders meetings in its New Jersey territory, called for the purpose of acquainting its customer owners with the history, growth and future prospects of the company as well as the relation of utility service to the life of the community.

The first fifteen meetings already held were termed "one-night stands" by the newspapers, for want of a better name, and officers of the company who gave freely of their time in attending the meetings and making the personal acquaintance of those present, pronounce the project a highly successful one. A newspaper man in a contiguous state attended one of the meetings and was so impressed with its success from a public relations standpoint that he commented, "When utility officials come out from behind frosted windows and gilded cages and shake hands with their customers and answer every question that is flung at them, you are going to see the knockers lay aside their hammers and toot horns."

The primary purpose of the meetings was educational. In a four-page pamphlet distributed to stockholders in advance of the meetings, the company described the project as follows:

"Within the last year, the list of Public Service Corporation Stockholders has been increased by many thousands, so that today there is scarcely a community of any size served by Public Service, in which there are not many citizens who are owners of the Corporation's stock.

"Every one of these stockholders is financially interested in the affairs of Public Service. Each of these numerous shares of stock is entitled to a vote on all matters concerning which stockholders are privileged to vote.

"Most of these purchasers of stock are new members of the Public Service family. Many of them must necessarily be unfamiliar with Public Service affairs, and with the aims and objects of the

management as they relate to future activities.

"Obviously, it is impossible to hold at any one place a meeting of stockholders which would be widely attended. Yet the officers of the Corporation felt that it was most desirable that they should have an opportunity to meet as large a number as possible of the stockholders face to face in order to discuss Public Service affairs with those most interested.

"Under these circumstances, the plan of having a series of meetings in those cities in Public Service territory most advantageously situated for the purpose was suggested and adopted.

"It is the intention to invite to these meetings all stockholders of Public Service Corporation and others who may be interested in its affairs. At each meeting there will be present at least two officers of Public Service Companies who will address those present upon the subject of the Corporation's past and present activities as they affect the interests both of the stockholders and the community, and who will discuss, as well, the companies' plans for the future as they are likely to affect the interest of the territory served.

"Public Service has taken and is taking such an important part in the development of New Jersey, and its future and the future of the State are so closely related, that a discussion of the character contemplated for these meetings cannot but be of very great general public interest.

"These meetings are not a part of the Corporation's stock selling campaign and no effort will be made to sell stock. They are in the nature of 'get together' meetings, between the men who are charged with the responsibility of managing one of the State's greatest enterprises, and those who are the most directly interested in the service rendered by the utilities embraced in the enterprise.

"In order to lend an additional interest and to do away with any appearance of formality, arrangements have been made with Mr. Henry Allen McPrice, a well known entertainer, for a program of music and readings at each meeting."

A second series of meetings taking in territory not already covered will be started in the near future.

The Georgia Railway and Power Company is sending out a very attractive card, the text of which is reproduced here, to every new gas and electric customer.

It strikes us as exceedingly good business and an attractive way of impressing their public with the service given.

"We welcome you as a customer with the wish that we may do a little more than assure you we are glad to have your name on our books. We want you to know we do not consider our service satisfactory until you are satisfied.

"So, if the service isn't all you are paying for, let us know. Only in that way can we make it satisfactory to you and this Company.

"Just telephone Ivy 4400 and ask for 'Electric Service' if there is any trouble with your electric service, or 'Gas Service' if the gas goes wrong.

"We will then show you, with something more tangible than words, how much we appreciate your patronage.

"GEORGIA RAILWAY & POWER COMPANY"
"General Sales Manager."

Commissioner Brundige on Advertising

THAT the best, most economical and most effective salesmanship is through advertising is held to be true by President Harley W. Brundige, of the California Railroad Commission.

Complaint had been made to the Commission that the Pacific Gas and Electric Company had advertised in a community where it had no competitor, and the right of the company to make this expenditure, which would be charged as operating expense, on which the public would eventually be compelled to pay rates for power and light, was challenged.

Commissioner Brundige, in his reply to the complainant, said:

"I cannot see what competition had to do with this class of advertising. Modern advertising is creative; it produces demand and brings new business. Its use is universal in industrial and commercial life. By producing volume it leads to quantity production and lowers prices. Much of the best national advertising is directed to this end. The great success in market expansion that has attended the advertising campaigns of cooperative farm groups, such as the raisin, citrus, prune and peach associations, may be accepted as proof. Merely taking trade away from a competitor without developing new business is a quite negligible feature of modern advertising.

"In my opinion, the advertising you have referred to is not only legitimate, but very desirable, as it is designed to increase the total sales of electric energy by stimulating use. At the present time, with the development of hydroelectric power, an expanded market is necessary to utilize this energy.

"The cost of selling this product is recognized as a legitimate operative expense, and advertising is conceded to be the most effective and at the same time, the most economical form of salesmanship.

"In stimulating additional use of electricity through effective advertising, the company by increasing volume decreases the cost to each consumer. Electricity that goes to waste must necessarily be paid for by somebody. The more of it that can be put to use the cheaper it will be for everybody.

"Even if the direct cost of the advertising is reflected in the rates, the indirect savings are bound also to reflect themselves in the ultimate rates, and the final saving will be greater than the immediate cost."—*Printers' Ink.*

Seventeen Reasons for Advertising

ROBERT M. SEARLE, President, Rochester Gas and Electric Corporation

1. The people are kept in touch with the operations of a company whose products, under present-day conditions of living are numbered among the necessaries of life.

2. We keep constantly before people their duty to themselves in the matter of utilization of our services for the purpose of avoiding excessive physical effort or drudgery and of saving time and money.

3. We stimulate thrift by bringing to the attention of people through forceful reasons backed by figures why it would be better for them to invest in our securities, which have all the elements of safety and which pay a high rate of return.

4. We teach people the many advantages of our guaranteed gas coke, particularly as a domestic fuel; teach them how to use it; teach them the money-saving advantages which accompany its use and stimulate their faith in our statements by guaranteeing to prove them to their satisfaction or save the people from loss by taking back the coke and refunding the money therefor.

5. We save human life by advising of the dangers that exist in certain situations beyond our control that accrue to distribution of gas and electricity, particularly in the electric field.

6. We stimulate helpfulness to one's neighbors by defining what one's duty to his neighbor consists of in the accident-prevention field.

7. We educated the public to expect less of certain things during the period of the World War in order that we might co-operate with the Government in its efforts to win the war.

8. We emphasize to the people from time to time what co-operative effort can do for the progress of the city.

9. We stimulate the boosting spirit of the community by boosting civic movements ourselves.

10. We teach people how to get the most service at the least cost from the gas and electricity they use.

11. We stimulate the use of gas and electricity as savers of labor, time and money by offering for sale highly efficient gas and electric current consuming devices at reasonable prices.

12. We warn the public against fakers who attempt to extort money from them by offering for sale devices for which they make false claims.

13. We remind manufacturers of the possibilities for increased production, better products and better working conditions through the use of gas and electricity.

14. We remind merchants of the possibilities for better shopping atmosphere, better working conditions, better display and more attractive store exteriors through the use of electricity.

15. We acquaint motor vehicle users with the advantages of more motor fuel from the standpoint of greater power, money saving, easier starting and greatly reduced carbon troubles.

16. We promote a better civic spirit by encouraging the youth of the city to

have a high regard for the property rights and personal safety of others, as witness the poster competition and publicity in connection with the wanton destruction of street lamp globes and the possibility of serious injury to innocent persons likely to result therefrom.

17. We tell the people that they have a right to fair and courteous treatment from us at all times. By so doing we exert a salutary influence upon the operations of our employees who follow our publicity very closely and who are thereby repeatedly reminded of what is expected of them in their dealings with the public.—*From Gas and Electric News, house magazine of the Rochester Company.*

Publicity Happenings

MORE Committees on Public Utility Information! Word comes from Washington, Texas, Tennessee, New York and Arkansas that committees will be operating in those states before this gets into print. If predictions come true, we will have in another thirty days from the time this is written, 18 committees on the job, disseminating public utility information in 25 states of the Union. Here is a nationwide movement that is making history for the cause of better public relations between utilities and customers.

Frank Le Roy Blanchard has been appointed director of the department of public relations of Henry L. Doherty and Company, New York. Mr. Blanchard will have charge of the company's publications and its advertising. George B. Walker, secretary of the commission on public relations of the American Bankers Association and formerly of the Wall Street bureaus of the New York Sun and Times, has been appointed news editor of Henry L. Doherty and Company.

"The bogey of a campaign for public ownership always sits in the ante-room of the executive offices of public service corporations," says Printers' Ink, in commenting upon the goodwill advertising now being done by the Pacific Gas and Electric Company. "Unless customers are well sold on service, any aspiring politician can inflame that bogey to the most annoying activity. That danger is small, however, when patrons generally understand that its great servant is honestly striving to do the best it can."

Incidentally, "National Gas Range Week" was inaugurated in Portland, Oregon, with the most effective advertising and publicity that we have seen for many a day. In one newspaper alone there were four solid pages devoted to advertising and publicity matter pointing out the strong points of appliances and the convenience of gas service. John H. Hartog, of the Portland Gas and Coke Company, was principally responsible for the large interest aroused through the printed word.

We are going to try out a new innova-

tion with our popular Chat ads. Instead of issuing the next series in one large proof sheet, we will issue them as well as the preceding 48 Chats in clip sheet form. Sixty little friend-makers in this convenient form will be welcomed by your editors and yourself.

The twenty-five full page utility advertisements that appeared in the New York Globe some months back are to be gathered in booklet form and handsomely illustrated, we understand. If this project materializes, we will issue a copy to our membership and plans will be made for distributing the booklet to customers of our member gas companies.

Another evidence of the close cooperation existing between local banking interests and the gas company is again brought to light in an advertisement recently published in the Chicago Tribune over the name of the Harris Trust and Savings Bank. Following the title, "Always on the Job," the copy reads:

"Most of the food in the cities is cooked with gas. Some of the heating and lighting is also done with gas. In Chicago, for example, over 90 per cent of the residences, hotels and restaurants are connected with the gas mains. This vast industry enters into the life of every one of us. It is never shut down because of slack trade or panic, but regardless of general business conditions is operated twenty-four hours a day every day in the year.

"The rates are generally fixed by law, based on the cost of furnishing adequate service to the community plus a fair return to the company. Moreover, it is practically a cash business. Because of the system of allowing discounts for prompt payment of bills and of shutting off service for non-payment, the credit losses are almost nothing.

"The stable character of this industry makes the bonds of well-managed gas companies, when properly safeguarded and passed upon by a responsible banking house, particularly satisfactory investments."

All good-will advertisements issued to date, 24 in all, have been collected in booklet form and a copy issued to our member companies, with the request that orders for matrices or electrotypes be forwarded promptly to us inasmuch as we can not attempt to keep a stock on hand.

"Telling the Public Utility Story" is the title of a 30-page booklet recently issued by the Michigan Committee on Public Utility Information for the use of those interested in giving public talks. The booklet covers all phases of the utility business and contains a mass of helpful data for public speakers. The Michigan committee is located at Ann Arbor. Requests for copies of this booklet should be sent there.

N. T Sellman, service engineer of the Association, is a member of the Forum Consultation Committee of the Architectural Forum, the magazine devoted to architects and builders.

John Moody, financial statistician, says: "Down East, where the average city's growth practically is limited to its birth rate, some people can't understand how California's public utilities can keep tackling big developments, but if these people came here and saw the thousands of buildings going up and understood that the gas and electricity and telephone companies cannot supply the needs of the community because of the rapid growth, they'd realize that California

will be undertaking stupendous power developments for many years to come."

We have made frequent comment upon the excellent good-will advertising being done by the Northern Indiana Gas and Electric Company. Recently this company published an advertisement under the heading "The Quality of Our Gas," which stated: "The quality of our gas is being demonstrated this week in a very unique manner in our show window, and you are requested to look at the exhibition of a tea kettle filled with water suspended eighteen inches in the air above a small gas flame that does not touch the kettle. The water keeps boiling at this distance away from the flame.

"It is visible evidence of the high heating quality of the gas furnished every day to our customers in this city. We are glad to remedy unsatisfactory service without charge. Complaints occasionally reach our office that the gas is poor. In every instance we find upon investigation of such cases that it is due to some local trouble on the premises, such as improper adjustment of burners, or a stoppage of some sort in the pipes or mains."

At the conventions of the Iowa, Pennsylvania and New Jersey Gas Associations, the newspapers devoted more space to the business transacted than they have ever done previously. Editors plainly show a real interest in utility affairs and this will increase along with the customer ownership idea. Wherever gas men meet, the newspapers should be fully informed of all developments.

A Book Worthy of Recommendation

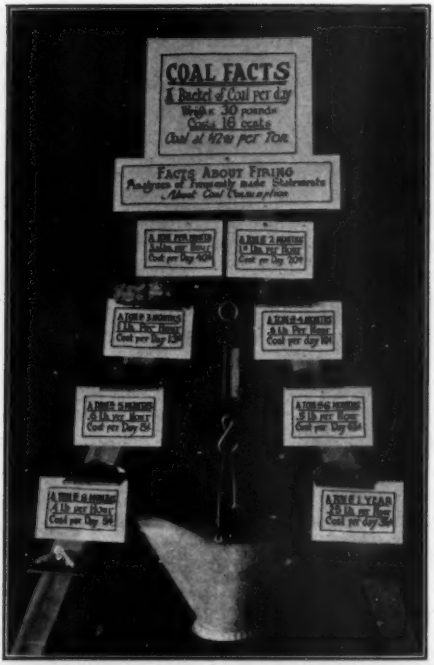
Every executive, every salesman, every employee of a gas company who wishes to see himself and his business aright from the public's viewpoint, will do well to have on his desk a copy of the recently published book by S M. Kennedy, vice-president of the Southern California Edison Company, entitled "Winning the Public."

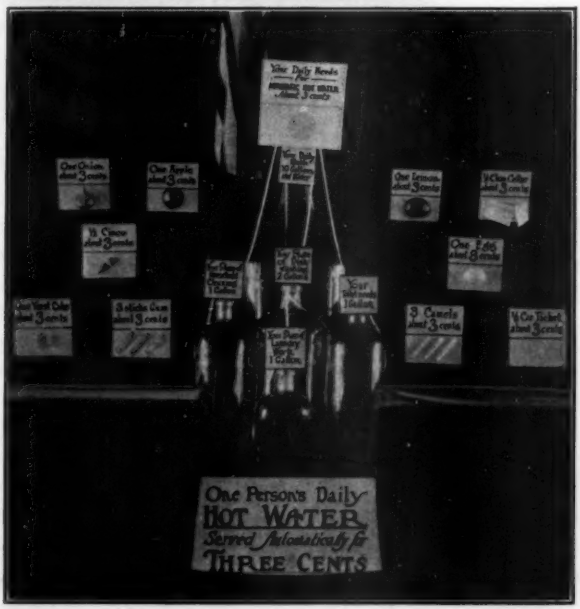
Here is a book that is not only a veritable mine of practical information for the man who is in direct charge of the public relations work of his company, but a book which engenders in every one who reads it a new and more inspiring vision of the great need for service in this past generation.

Some noteworthy chapters are: "Transforming Public Opinion," "The Value of Courtesy," "The Man in the Street," "Potential Publicity," "The Commercial Instinct," "Service," and "That the People May Know."

Mr. Kennedy's book is published by the McGraw-Hill Book Company, 370 Seventh Avenue and sells for $2.00 a copy.

Send orders to that address.





The illustrations show two exhibits designed by H. H. Ganser, manager of the Counties Gas Company, Norristown, Pa., to accompany his paper on water heating which was one of the outstanding features of the recent Pennsylvania-New Jersey meeting.

One exhibit depicts in most effective fashion the price comparison between gas hot-water service and daily trifles of insignificant cost. The other shows how much coal is used by the fellow who claims that a coal fired water heater is cheaper to operate than a gas fired one.

MANUFACTURERS SECTION

JOHN S. DeHART, Jr., Chairman — F. A. LEMKE, Vice-Chairman

C. W. BERGHORN, Jr., Secretary

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DEHART, JR., JOHN S., Newark, N. J.
DICKEY, C. H., New York, N. Y.
FERRIS, E. J., New York, N. Y.
GREENE, J. J., New York, N. Y.
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LEMKE, F. A., Kalamazoo, Mich.
McDONALD, DONALD, New York, N. Y.
ROPER, GEORGE D., Rockford, Ill.
SHERWOOD, J. M., New York, N. Y.
STITES, TOWNSEND, Gloucester, N. J.

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GIBSON, W. R., Toronto, Can. (Canadian)
MILLER, THOMAS D., Detroit, Mich. (Illinois)
WESTON, J. A., Lansing, Mich. (Indiana)
ROPER, GEORGE D., Rockford, Ill. (Iowa Dist.)
SCHALL, H. D., Detroit, Mich. (Michigan)
KELSEY, L. D., Brookfield, Mo. (Missouri)
NORTON, ARTHUR E., Boston, Mass. (N. E. Gas Eng.)
BARTLETT, C. E. (New Jersey)
EGLESTON, G. P., San Francisco, Calif. (Pacific Coast)
BARTLETT, C. E., Philadelphia, Pa. (Pennsylvania)
SEIDENGLANZ, C. H., Dallas, Tex. (So. Central)
SPARKS, F. F., Chattanooga, Tenn. (Southern)
McCULLOUGH, CHARLES, Milwaukee, Wisc. (Wisconsin)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Exhibition—JOHN S. DEHART, JR., Newark, N. J.
Nominating—GEORGE D. ROPER, Rockford, Ill.
Division of Accessories Manufacturers—J. M. SHERWOOD, New York, N. Y.
Division of Apparatus and Works Manufacturers—D. J. COLLINS, Philadelphia, Pa.
Division of Gas Range Manufacturers—WM. M. CRANE, New York, N. Y.
Division of Heating Appliance Manufacturers—K. S. CLOW, Chicago, Ill.
Division of Industrial Appliance Manufacturers—WM. B. KOPPER, Brooklyn, N. Y.
Division of Lighting Appliance Manufacturers—TOWNSEND STITES, Gloucester, N. J.
Division of Meter Manufacturers—DONALD McDONALD, New York, N. Y.
Division of Office Labor Saving Devices Manufacturers—E. J. FERRIS, New York, N. Y.
Division of Water Heater Manufacturers—A. P. BRILL, Pittsburgh, Pa.
Division of Supply Manufacturers—J. J. GREENE New York, N. Y.

Gas Appliance Statistics

There can be no question of the value of complete statistics on the gas appliance industry. The lack of such data is most regrettable. Therefore, we are publishing the appeal sent out from the headquarters of the Association in the hope that it may influence every manufacturer to fill out the required questionnaire. [EDITOR'S NOTE.]

ONE of the matters of discussion in the session of the Manufacturers Section during the annual convention in Chicago was the desirability of compiling some general statistics which would indicate the size and importance of the gas appliance industry. Our efforts made to secure such information in the past have not been successful, possibly, because it has not been made sufficiently clear to our members the purpose for which the information is desired and the use to which it will be put.

The Association has been successful in securing reasonably accurate and comprehensive statistics of the manufactured gas industry. These have been of the greatest practical value in public relations' work and in the Association's publicity and educational effort. We feel that these data have contributed more than any other one thing to the success of the publicity work that has been done. Not only have they been widely quoted and used in newspapers and magazines, but they have served equally well in the

many popular lectures and talks which are being given in increasing numbers.

It has been a matter of regret that we have been unable to secure information of this character that could be used to the advantage of manufacturers. Only within the last few days we received a request for the total investment of manufacturers of gas appliances in the United States and the gross amount of business done each year. We were compelled to say that we could not furnish this information. We are quoting below several extracts from the letter written by the gentleman who made this request, for he makes very clear the value of such information and the practical uses to which it can be put.

"I wanted to use these figures in a talk which I am to give at a meeting where there will be present a large number of officials from the local gas company, Furniture Dealers Association, Hardware Dealers Association, and representatives from appliance manufactures, distributors, jobbers and plumbers. I have a great many other figures of interest which I am going to use in my talk, but wished to impress the guests present with the enormous amount of money that must be invested in the gas appliance business. Those of us who are interested know that figures on the total investment in gas properties are easily obtainable, but a business as important as the appliance business should also be represented and we know of no other organization that can obtain these figures but the American Gas Association."

We are going to make another effort to collect such data and your cooperation is earnestly requested. You have our assurance that this information will be used to compile only total and general figures. In no case will it be referred to separately or consulted with regard to any one manufacturer, and to give you convincing assurance on this point we have resorted to the double envelope system. The outer envelope bearing our address will contain a short printed form for your signature, showing that you have complied with our request together with a sealed envelope which will contain nothing but the questionnaire. Neither the inner envelope nor the questionnaire will bear any identifying marks whatsoever. Your name will then be checked off the list and the outer envelope will be destroyed. There will be no way of telling who supplied any partucular set of figures, but we will have the data upon which to base the totals and to tell the public as well as the gas industry what a big and important industry the gas appliance manufacturing business is.

We think that this activity, which is in your own interest, deserves your hearty support and we hope for the prompt return of the enclosed form giving all the information you can.

QUESTIONNAIRE

1. Total investment in business (give the investment of your company in the gas appliance business) $.....

2. Total gross sales (dollars) of appliances for 1921 as follows:

	1921
Gas Tubing	$
Industrial Gas Burners	
Industrial Gas Appliances	
Gas Ranges—all classes	
Gas Arc Lamps	
Gas Portables	
Gas Fixtures	
Gas Lights (Incandescent)	
Gas Mantles (Incandescent)	
Water Heaters—all classes	
Fireplace Heaters	
Miscellaneous Appliances	
Accessories	
Gas Irons	
Gas Ironing Machines	
Combination Fireless Cookers	
Garage Heaters	
Gas Stove Lighters	
Incinerators	
Gas-Fired Boilers	
Total for your company	$

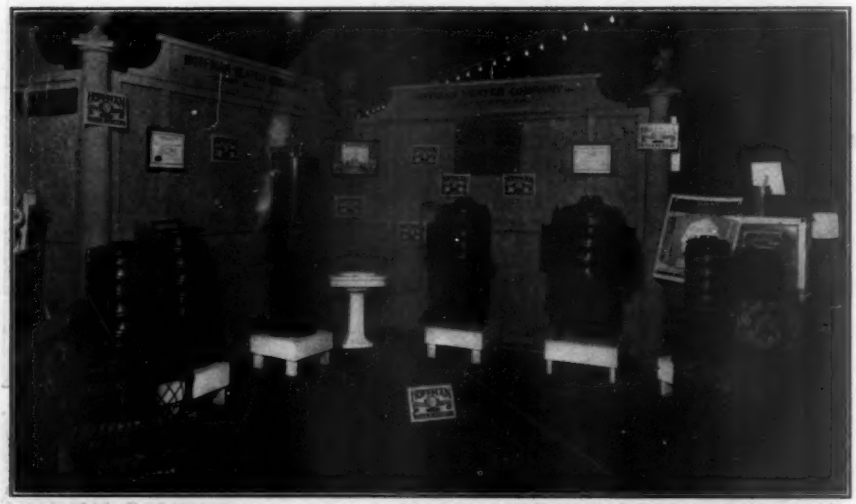
Gas a Big Feature of New York Show

GAS played a prominent part at the Own Your Own Home exposition held in New York City recently. The model home exhibited was the principal attraction and was visited by several hundred thousand persons during the two weeks that the exposition was held. In the home were Welsbach lighting units, a Smoothtop gas range, a Radiantfire, and in the laundry a Ruud automatic heater.

Many other manufacturer company

members of the A. G. A. exhibited, their exhibits being arranged in booths contiguous to the model home. Individual booths were occupied by the William M. Crane Co., the Hoffman Co., the Ruud Co., the General Gas Light Co., the Welsbach Co., the Humphrey Co., the Pittsburgh Co., the Lovekin Co., the Kompak Co., and the Manhattan Gas Heating Company, which exhibited Garland ranges. Tappan ranges were shown, besides numerous types of combination gas and coal ranges.

A number of direct sales were made by the gas exhibitors on the floor of the exposition and lists containing hundreds of prospects were obtained from the thousands of people interested in modern labor-saving equipment who filed past the booths in a steady stream for two weeks.



Correction

In the Monthly for December there appeared an article on "Thermostatic Gas Oven Control." This was contributed in response to a request made by us to members of our Manufacturers Section for articles descriptive of new convenience features in appliance development. Its publication resulted in a protest from one of our company members, who felt that the article wrongly criticized certain features of construction embodied in the Lorain regulator.

We have tried very earnestly, and we believe with gratifying success, to have the material which appears in the Monthly devoted to the interest of all of our members—obviously, the only sound policy for an association organ such as ours. Only through inadvertence would this policy be departed from and this is our apology for the case in point.

The Lorain regulator, with a record of eight years in service and a broad campaign of national advertising behind it, needs no defense at our hands.

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LOUIS STOTZ, Secretary

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FISHER, R. E., San Francisco, Cal. (Pacific Coast)
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JOHNSON, W. B., Toronto, Ont., Canada. (Canadian)
ST. JOHN, JOHN, Madison, Wisc. (Wisconsin)
WALLACE, R. S., Peoria, Ill. (Illinois)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Contributions to Monthly—Representatives, Affiliated Societies
Industrial Sales—F. F. CAULEY, Chicago, Ill.
Sales Stimulation—WM. GOULD, Boston, Mass.
Educational Pamphlets (Sub.)—J. P. HANLAN, Newark, N. J.
Merchandise Advertising (Sub.)—J. E. DAVIES, Chicago, Ill.
Program—WM. GOULD, Boston, Mass.

House to House Selling of Water Heaters

The following outlined plan of intensive selling of water heaters has been adopted by The Public Service Gas Company of New Jersey, and is printed here since it may contain valuable suggestions to other companies. (EDITOR'S NOTE.)

SALES Managers should select districts that lend themselves best to the successful carrying on of this kind of selling. The best districts would seem to be suburban towns or residential sections of a city in which one or two family houses predominate. Neighborhoods where flats and apartments predominate should not be canvassed by wagon method until all more suitable districts are completed. The districts finally selected are to be "fine tooth combed" by capable sales representatives supervised by the sales manager in person, who is to go out with the force of sales representatives and personally direct their efforts, remaining with them until the close of the day's work.

One thing which should be insisted upon during this water heater drive is that the sales representatives with wagons devote at least five hours per day, three days per week, to covering the district.

Credit for all sales should go to the man making the sale while the crew is working from the wagon. All sales subsequently made from prospects are to go to the sales representative in whose district the prospect is located, providing the sale is made within the time allowed at present.

Prior to starting work on the district,

the agent is to furnish the sales assistant with a complete set of cards upon which cards the names and addresses of the customers are to be written. Forty names and addresses are to be provided for each man daily so that the men will have sufficient names for a day's work, allowing for people who are away and others who cannot be seen. The sales representatives are postively prohibited during this wagon sales from selling by hit and miss methods and without names and addresses.

The sales manager will work one street, a block at a time, dividing the names on each block with his crew. He should get reports back on these names before giving a man more names and before moving to another street or block. This is done in order to insure close work between the sales assistant and his men and to insure the sales representatives getting help from the sales assistant. The sales representatives will make a full report on each card handed them and fill in the information asked for on the cards.

The sales representative will, by virtue of having the name of the customer on his card, be able to call her by name and introduce himself. He is to inquire if her gas appliances are giving entire satisfaction. He should endeavor to get in the kitchen, and once there can see whether the consumer has a gas range and water heater, the condition of each and whether they are in his opinion of a type that will afford the customer the best service.

If the customer has a tank water heater, the sales representative is to endeavor to replace it with an automatic type, provided in the judgment of the sales representative the character of the house and the hot water requirements of the family would justify the customer making the replacement. In which event the sales representative is authorized to make the offer of allowing $10.00 for the tank heater on the purchase price of the new automatic storage water heater.

If the tank water heater is about worn out and the character of the house and hot water requirements are well taken care of by a tank water heater, the sales representative is to endeavor to sell the customer an enamelled tank heater and is authorized to make an offer of $3.00 for the old tank water heater on the purchase price of the new enamelled tank water heater.

The sales representative is also to go over the customer's gas range very carefully and ascertain its condition. If it is about worn out, he is to endeavor to sell the customer a new gas range and is authorized to make the customer an allowance of $3.00 for the old gas range in exchange for a cabinet range, preferably. If the customer is using a hot plate, the sales representative is to endeavor to sell a range to replace it and is authorized to make an allowance of $2.00 on the purchase price of a new range, a cabinet model, perferably.

If the customer's range is not worn out, the sales representative is to talk to the customer about the advantages of the Oven Heat Regulator Types of ranges and to make an offer to place one in on the 30 Day Free Trial Plan.

If the customer's range, water heater or any other appliance is not working satisfactorily, and requires regulation or adjustment, the sales representative is to make out a complaint card; for instance, if the oven does not bake properly and the stove is in good condition, he is to

make out an order, "Customer's Range Does Not Bake Satisfactorily." If the water heater burns with a yellow instead of a blue flame, the card should state "Water Heater Burns with a Yellow Flame." In other words, the complaint card should state the real nature of the complaint.

Where the customer has not a tank water heater and the character of the house would indicate that the customer would not be a legitimate prospect for an automatic storage heater the sales representative is to endeavor to bring into the customer's kitchen and demonstrate to the customer an enamel tank water heater. The sales representative is to point out the exclusive features of the heater, dwell on the comfort it would bring to her home, how little a hot water heater costs to use and how quickly hot water may be had for various domestic purposes. He is to emphasize the small amount the monthly payments really are when figured on a weekly basis, as they are less than 80c per week. The sales representative also should bring out the fact that the first cost is not the only consideration in buying a water heater, that maintenance, cost of operation and the quickness of which heater furnishes hot water should help the customer in making a decision as to the water heater she selects. After the demonstration the sales representative is to endeavor to get a contract signed.

If the customer expresses a desire to think the matter over or talk it over with her husband, he is authorized to leave the heater providing the customer is willing to sign the contract on the basis of an "Overnight Approval." On all such contracts the salesman is to write "48 Hour Approval Basis." On the following day, the regular sales representative is to call on the customer and if he cannot sell the heater he is to arrange with the wagon which he is working with to pick up the heater immediately. If the customer finally decides to take the heater the salesman will get another contract signed and destroy the "48 Hour Approval Basis" contract.

This special wagon sales effort is for the express purpose of enabling the sales representatives to make more sales of tank water heaters than would ordinarily be made by them on a regular convass, through their being able to demonstrate the tank water heaters in the houses of their prospects.

Where the sales representative interests a customer in an automatic storage heater, he should go over the features of the heater best suited for the needs of her home with her, explaining the terms of sale and leaving a contract filled out for the customer's signature if he cannot close the sale then and there.

Sales representatives will also be expected to leave with customers suitable advertising matter on the article needed. Sales representatives are expected to use judgment in not recklessly distributing costly advertising, such as automatic storage water heater booklets. There should be a private mailing card provided to be left with each customer called upon whether at home or out, so that an order for an article or a complaint of service may be sent in easily.

The present plan is to use a horse and long bodied open top delivery wagon or one horse open truck, or motor truck. This will enable customers to see articles easily on the wagon and by having a long bodied wagon such as carpenters use, several large articles can be placed on the wagon.

What One Company is Doing on the Water Heating Drive

The Consolidated Gas Company of New York and its affiliated gas companies have under way an intensive and comprehensive sales plan for stimulating the more general use of gas for water heating in their territory. This article enumerates the various steps which are being taken to make this a major effort this year. The suggestions, with such modifications as may be necessary to fit local conditions, will undoubtedly be found helpful by other companies. What is your company doing to increase its water heater business? (EDITOR'S NOTE).

THERE has been formed a Water Heating and House Heating Division of the Appliance Department. This division will specialize entirely in water heating during this season of the year, and as indicated by the accompanying reproduction, the company is advertising extensively in the newspapers and trade journals.

Everybody Needs Hot Water

This Tells How to Get It

For the greater convenience of our customers we have just organized a

WATER HEATING & HOUSE HEATING DIVISION

at No. 130 East Fifteenth Street

OUR experts will give prompt attention to those who are considering the use of Gas either for Heating Water or the Heating of a House, Apartment, Loft or Large Building.

Architects and Builders, with advantage to themselves and their clients, should ask for the services of one of our highly qualified Experts. His services are gratis.

As to Gas Water Heating: There are Gas Water Heaters for use in the Home, Office or Factory. Then again we install a Gas Water Heating System that will furnish a large building with an instantaneous, uninterrupted, Summer or all-year-round supply of hot water. The Gas Boiler installed requires no attention. It regulates itself automatically.

Many private houses are using this System, as well as many large buildings. One of the latter requires nearly 40,000 gallons of hot water every week. Another large building requires nearly 6,000 gallons a day, every drop of which is Gas heated.

Every person interested in a newly constructed building, or one under construction or contemplated, or in a building being or about to be remodeled, should consider the advantages of Gas Water Heating.

Consolidated Gas Company of New York

GEO. B. CORTELYOU, President

Telephone Stuyvesant 6000

In addition, a very thorough and systematic program of additional advertising is being carried out, to wit—newspaper advertising by those water heater manufacturers whose appliances are sold by the company—circular advertising to private homes by an automatic water heater company, followed up by the gas company's district sales force,—personal letters to a selected list of wealthy private homes on automatic water heaters, this, too, followed up by the gas company's district sales force—gas bill stickers to all private homes, stores, factories, etc.—large posters on all the company's wagons and trucks—distribution of water heating folders to the gas company's customers by water heater manufacturers.

In their branch offices and display rooms, special floor displays have been made, together with special window displays with prizes offered to the best windows. A system of special education of the floor and district sales forces has also been inaugurated and a quota has been set for each salesman for the months of April, May and June. An intensive drive is to be made to see that the salesmen reach this quota which has been placed at 100% over the sales made in 1921.

A Prize Window Display

Special prices have been made on automatic and circulating water heaters to the plumbing trade and a strict canvass of every plumber in the city has been made by the district salesmen.

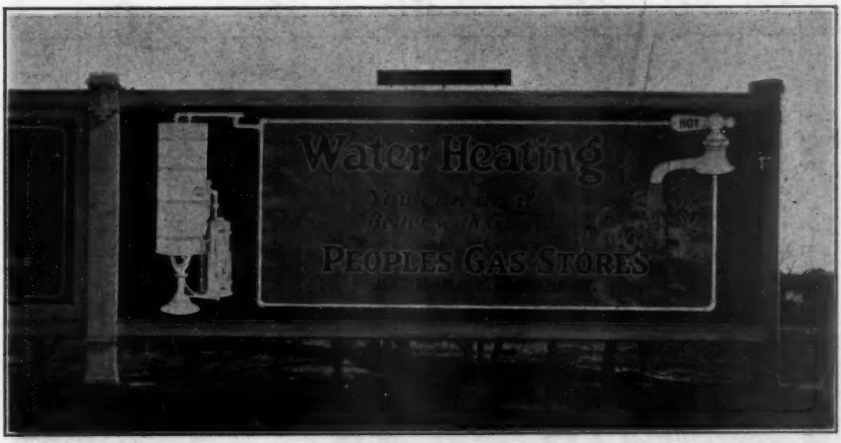
An example of the methods used in display room advertising is given below—

GAS WATER HEATERS
Gas water heaters
Are economical and
Serviceable

HOT WATER
When and where you want it
Any time you want it
Turn on the faucet, you get it
Exceptionally convenient and
Reasonably priced

HOT WATER
Homes, stores and restaurants
Easily supplied with an
Automatic gas water heater
To meet the required demand
Efficient and
Reliable is the
Service of a

GAS HOT WATER HEATER



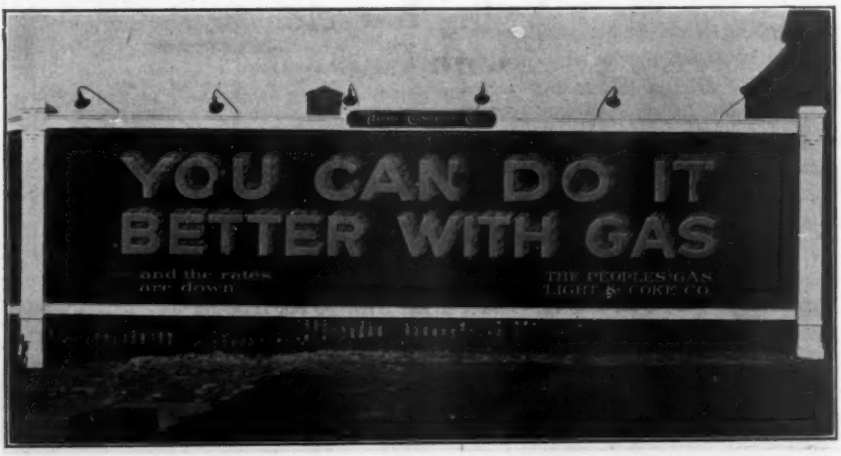
Chicago Gets Under Way

Chicago got its water heating campaign under way on April 3rd with a broadside of newspaper advertising. This was followed up immediately by a direct-by-mail campaign using three pieces of literature and with the follow-up of the special sales force.

In additon to this a general advertising campaign using billboard ads along the most prominent boulevards of the city as shown in the accompanying cuts was instituted.

Reports from the campaign so far indicate a much larger percentage of business in automatic water heating than in any previous week's selling ever made by this company.

Let us hear what some of the other companies are doing in their intensive water heater campaigns.



THE COOPERAGE INDUSTRY

Drying Barrels with Gas

120,000,000 Barrels Made in the United States per Year.

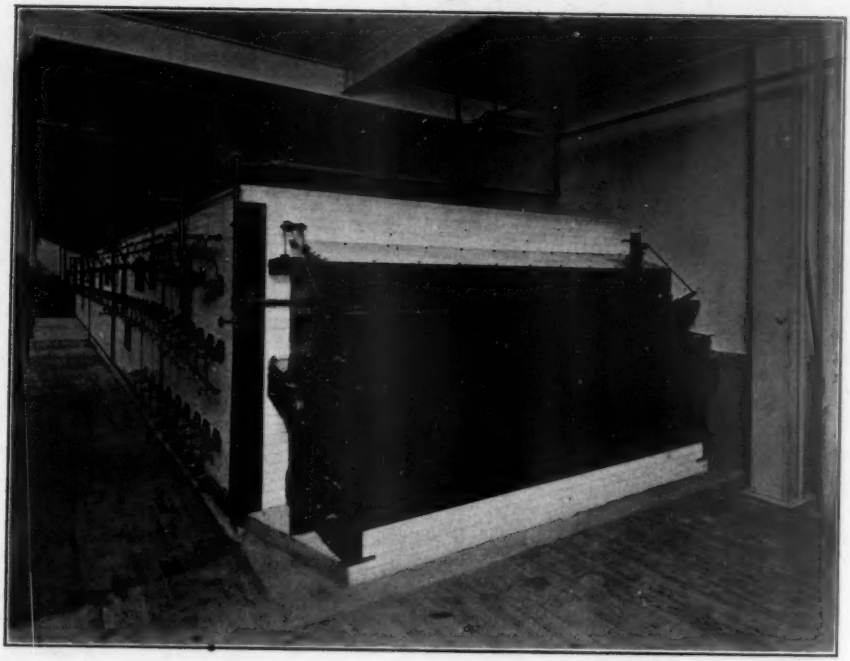
This Plant (32 fires) turns out 60,000 Barrels per month with a Gas consumption of 700,000 cu. ft.

16 Gal.—45 lb. Barrel dried with 8 cu. ft. Gas.

50 Gal.—85 lb. Barrel dried with 16 cu. ft. Gas.

535 B.t.u. Gas Supplied.

Detailed information on file, A. G. A. Headquarters.



WHOLESALE BREAD BAKING WITH GAS

Conveyor Type Baking Oven 100 ft. long, 9 ft. wide

Baking Capacity 6000 one-lb. loaves of bread per hour, using 3000 cu. ft. of 500 B.t.u. Gas.

Bread Baking is a very desirable class of business. It is carried on in every town and city. Gas-men should be alert to the situation and go after it.

Detailed information on file at A. G. A. Headquarters.

BREAD BAKING WITH GAS

Gas Heated Ovens for Bakers

Requiring 500 to 1000 loaves per hour

Production—6765 1½ lb. loaves in 7 hours.

Consumption—7150 cu. ft. of 528 B.t.u. Gas.

This business furnishes good revenue to Gas Companies. Approx. 2,000,000 cu. ft. of gas per year per oven.

Detailed information on file at A. G. A. Headquarters.

Associations Affiliated with A. G. A.

Canadian Gas Association

Date of Affiliation—Mar. 25, 1919
Pres.—C. S. Bagg, Montreal Light, Heat & Power Co., Montreal, Que.
Sec.-Tr.—G. W. Allen, Consumers' Gas Co., Toronto.
Conv., Hamilton, Ontario, Aug. 24-25, 1922.

Empire State Gas and Electric Association

Date of Affiliation—Nov. 21 1919
Pres.—E. H. Rosenquest, Bronx Gas & Electric Co., Bronx, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Conv., Lake Placid, N. Y., Oct. 1922.

Illinois Gas Association

Date of Affiliation—Mar. 19, 1919
Pres.—R. S. Wallace, Central Illinois Light Co., Peoria, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., 1923.

Indiana Gas Association

Date of Affiliation—April 24, 1919
Pres.—F. B. Tracy, Central Indiana Gas. Co., Muncie, Ind.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., 1923.

Iowa District Gas Association

Date of Affiliation—May 21, 1919
Pres.—H. B. Maynard, Citizens Gas & Electric Co., Waterloo, Ia.
Sec.-Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., 1923.

Michigan Gas Association

Date of Affiliation—Sept. 18, 1919
Pres.—J. A. Brown, Hodenpyl, Hardy & Co., Jackson, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., 1922.

Missouri Association of Public Utilities

Date of Affiliation—June 18, 1920
Pres.—H. Spoehrer, Union Elec. Lt. & Pr. Co., St. Louis, Mo.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Wiley F. Corl, Chmn. Affiliation Com., Missouri Utilities Co., Mexico, Mo.
Conv., 1923.

New England Association of Gas Engineers

Date of Affiliation—Feb. 19, 1919
Pres.—V. E. Bird, Connecticut Power Co., New London, Conn.
Sec.-Tr.—J. L. Tudbury, Salem Gas Light Co., Salem, Mass.
Conv., 1923.

Gas Sales Association of New England

Date of Affiliation—Oct. 1, 1919
Gov.—F. A. Woodhead, Arlington Gas Light Co., Arlington, Mass.
Sec.—M. Bernard Webber, 150 Congress St., Boston, Mass.
Annual Meeting, 1923.

New Jersey Gas Association

Date of Affiliation—April 25, 1919
Pres.—Jacob B. Jones, Bridgeton Gas Light Co., Bridgeton, N. J.
Sec.-Tr.—H. E. Mason, Consolidated Gas Co. of N. J. Long Branch, N. J.
Conv., 1923.

Pacific Coast Gas Association

Date of Affiliation—Sept. 18, 1919
Pres.—Henry Bostwick, Pacific Gas & Electric Co., San Francisco, Cal.
Sec.-Tr.—W. M. Henderson, 812 Howard St., San Francisco, Cal.
Conv., Santa Barbara, Cal., September, 19-22, 1922.

Pennsylvania Gas Association

Date of Affiliation—April 10, 1919
Pres.—Luther Gaston, Lebanon Gas & Fuel Co., Lebanon, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., 1923.

South Central Gas Association

Date of Affiliation—Oct. 15, 1919
Pres.—Frank L. Weisser, San Antonio Public Service Co., San Antonio, Texas.
Sec.-Tr.—S. J. Ballinger, San Antonio Public Service Co., San Antonio, Texas.
Conv., Hot Springs, Ark., Oct. 10-11-12, 1922.

Southern Gas Association

Date of Affiliation—May 20, 1919
Pres.—P. H. Gadsden, The United Gas Improvement Co., Philadelphia, Pa.
Sec.-Tr.—G. H. Smith, City Gas Co., Norfolk, Va.
Conv., 1923.

Wisconsin Utilities Association

Pres.—J. P. Pulliam, Wisconsin Public Service Co., Milwaukee, Wis.
Exec.-Sec.J. N. Cadby, 445 Washington Bldg., Madison, Wis.
Conv., 1923.

TECHNICAL SECTION

C. N. CHUBB, Chairman — F. C. WEBER, Vice-Chairman

H. W. HARTMAN, Secretary

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WING, J. F., Boston, Mass.

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CHUBB, C. N., Davenport, Iowa. (Iowa)
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ELBERT, V. L., St. Joseph, Mo. (Missouri)
FERRIER, JAS., Atlanta, Ga. (Southern Gas)
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LYONS, B. F., Beloit, Wis. (Wisconsin)
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Use of Mixture of Bituminous Coal and Coke as Generator Fuel in a Water Gas Set—C. W. BRADLEY, Chicago, Ill.

Typical Distribution Systems for Small Gas Plants

A. C. HOWARD, United Gas & Electric Engineering Corpn., New York, N. Y.

The following descriptions of distribution systems designed for a number of smaller gas plants are published with the approval of the Distribution Design Committee with the hope that the plans as outlined may be of assistance to other gas companies having similar distribution problems.

It should be noted that the description for Companies Nos. 2, 4, 8 and 11 has been omitted because the problems encountered were similar to other companies described. [EDITOR'S NOTE.]

COMPANY NO. 1

Serves 22,000 customers and sends out about 1200 million cu. ft. per year. The load factor is poor as the maximum daily send-out is 6000 M. Ten years ago, this company supplied all gas under low pressure except that pumped through a 10 inch main by means of an ordinary No. 7 Roots Exhauster. This line ran in a southerly direction, and was about 2 miles long and admitted gas to the L. P. system through one district governor at its extreme end. It was laid for this purpose and no services were connected to it.

In 1913, a distributing system was installed in a small town lying in a general westerly direction from the gas works. A holder was built in this town and gas was distributed from it through a new-

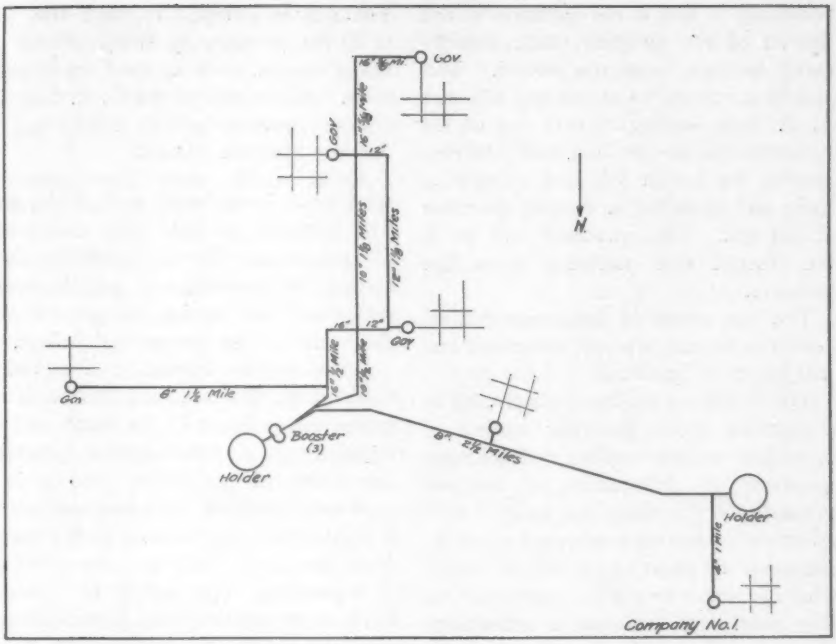
ly installed low pressure system. An 8 inch pumping line two and a half miles long was laid from the gas works in the larger city to supply this holder. Two new positive blowers were installed at the gas works to take on this additional load as well as to augment the gas supply through the 10 inch main to the south end, then growing weak. Later, a 16 inch transmission pumping main was connected to the end of the 10 inch main and continued much farther south, district governors being installed where needed.

A short time ago the pressures during peak send-out were found to be low in the east end, which was served by low pressure; also in the south end, due to the inadequacy of the 10 inch pumping line; and it was difficult to keep the holder up in the smaller town, when pumping at 5 pounds pressure. This latter trouble was increased because a district governor had been added, which was taking gas from the 8 inch line to the outlying holder at a point about a mile and a half before it reached the holder, and because the boosters were too small for supplying both the city and town, during peaks, even with both boosters in operation.

Our problems were; (1) to increase the supply to the low-pressure-served east end, preferably by pumping; (2) to increase the supply to the south end by supplementing the 10 inch portion of the pumping line; (3) to add to the pumping capacity to the city, both in pressure and volume; (4) to increase the pressure in the 8 inch line to the outlying holder in order to speed up the pumping rate.

Problem No. 1 is being worked out by converting an 8 inch L. P. main into a pumping main. To do this, all low pressure mains crossing this main at street corners were cut loose, and their ends reconnected over the top of the new pumping main. They were also connected under the converted main by a Scotch yoke of 2 inch pipe, so that the flow of drip would not be interrupted. All services connected to this main were equipped with service governors. A district governor was installed at the end of the pumping line where there were a sufficient number of large L. P. mains to carry away the gas from the governor in all directions. Other district governors will be installed at points where pressure may suffer from the loss of the gas formerly supplied by the present pumping line when it was under low pressure. During off-peak hours, the 8 inch line will be under holder pressure.

Problem No. 2 is being solved by converting a 16 inch line running in a southerly direction from the gas works in a street parallel to and two blocks east of the street in which the 10 inch pumping line is laid. About three-fourths mile of this 16 inch line was converted in the same manner as the 8 inch previously described. From the end of the converted 16 inch line two city blocks of new 16 inch pumping line was laid in a westerly direction and tied into the ten inch pumping line previously mentioned. A new 12 inch pumping line was laid extending two blocks further west from this point and connected into a L. P. 12 inch main running south. The latter 12 inch main was converted to high pressure to a point two blocks west of the southern end of the 10 inch pumping main and then these two lines were connected by laying two blocks of new 12 inch pumping main. The result was that by laying a very few feet of new pipe



and converting several miles of low pressure mains, we had a pumping system made up of 10 inch and 16 inch mains in parallel feeding 10 inch and 12 inch mains in parallel, which in turn feed a single 16 inch line.

Problem No. 3 is being solved by installing a larger capacity booster driven by a direct connected Nordberg uniflow engine, which can deliver gas to the mains at 7½ lbs. pressure. The pumping lines supplying the south end and that to the east end are supplied by the same booster discharge line. The line to the outlying holder can be supplied from the common discharge or isolated. The boosters are so piped that all three or any pair, or any single booster, can deliver gas either to the city line only or to the outlying holder line, or to both of these lines, and so that any one or pair of boosters can supply one of these lines while the other booster or pair of boosters supplies the other.

Problem No. 4 is being solved by arranging the booster piping so that in addition to the pumping combinations mentioned under problem 3, either small booster can receive at 7½ lbs., a part of the gas pumped by the new booster, and increase its pressure by 5 lbs. and deliver it into the outlying holder pumping line at the increased pressure of 12½ lbs. The balance of the gas from the new booster will at the same time be delivered to the city pumping lines at 7½ lbs. Furthermore, the two smaller boosters can be operated in series and supply gas at possibly 10 lbs. pressure to the outlying holder line while the new large booster is pumping into the city pumping lines.

Another trouble which has been ex-

perienced of late is low pressure in one district of the outlying town, that located farthest from the holder. This will be corrected by connecting a 4 inch L. P. main leading to this end of the town into the booster line, and then converting the 4 inch line into a pumping main and installing a district governor at the end. This governor will be in the district now suffering from low pressure.

The last series of improvements referred to herein, are just completed and will be put in operation in a few days.

The Nordberg engine is controlled by a constant speed governor instead of operating as the ordinary diaphragm governor or maintaining a uniform pressure by throttling the steam. This governor maintains a constant speed by changing the point of cut off, no matter what the steam or gas pressures may be. The proper gas pressure is maintained by the engineer, who changes the governor adjustment to suit the demand by turning a hand wheel on the governor provided for the purpose. He will be guided in regulating the engine by the readings of a telemetric pressure gauge near the end of the longest pumping main.

COMPANY NO. 3

This company serves 14,000 consumers and distributes 600 million cubic feet per year, the maximum day being about 2350 M.

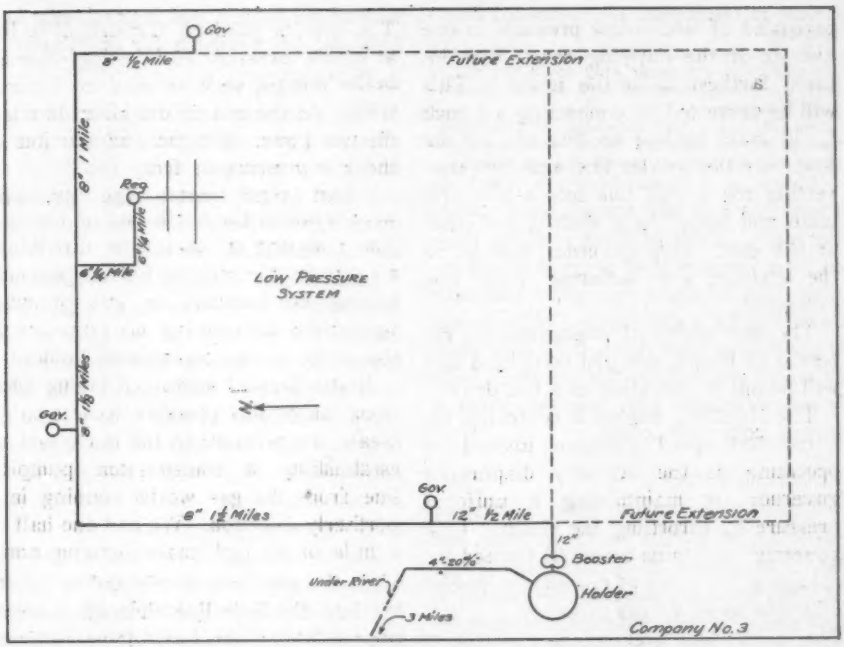
The gas works are southwest of the center of population of the city. The company supplies this city and also an outlying town on the opposite side of a river.

The gas has always been delivered to the small town across the river through a 4 inch line laid on the river bottom. The gas is pumped through this line at 20 lbs. pressure by Westinghouse air brake pumps, such as used on locomotives. At the end of the H. P. line is a district governor which admits gas to the low pressure system.

About eight years ago pressures were weak in the north end of the city. The company at that time distributed all gas in the city at holder pressure, having no boosting or gas pumping equipment and having no governor at the outlet of the commercial holder.

It was decided instead of laying additional large flow pressure feeders to increase the pressure in the north end by establishing a transmission pumping line from the gas works running in a northerly direction. We had one half of a mile of 12 inch main running north from the plant which was converted into a pumping main, simply by connecting a steam engine driven positive booster to the works end, cutting loose L. P. mains and then installing house governors on all services receiving gas from same. This line was extended further north by laying 8 inch pipe running in a northerly direction from the north end of the converted 12 inch pipe. Two district governors admitting gas to the low pressure system, were connected to this line, and at the same time a diaphragm holder governor was installed at the gas works. This installation immediately corrected pressure troubles in the north end. After it was put in operation, we noticed a reduction in the unaccounted-for gas, not only the total, but the percentage, and that per mile of 3 inch equivalent main.

When this first installation was made, we planned for this pumping line to be the first link of a transmission line which would be added to only when



necessary, piece by piece, until we eventually completed a belt line around the city. Of course, additions to the gas pumping equipment were contemplated, also. Since then we have found it necessary, from time to time, to lengthen the pumping main and install new governors and also to add to the pumping equipment. In each case, we, by conversion, used existing low pressure pipe as sections of the transmission line, whenever we could find L. P. mains of proper size conveniently located. The pumping main now runs to the north end of the city and turns east and then south on its return trip to the gas works. The southern end of the city has not grown so rapidly as the northern, from a gas sales standpoint, as all of the industrial customers are in the north end. We will probably depart from our original plan in so far as we will lay or convert a pumping line east from the plant and then north to meet and connect with the end of the present main and thus complete a loop around the north end instead of a loop around the entire city. Later, when necessary, we will loop the southern end also and thus form a figure eight.

The transmission line receives gas at a pressure not over 5 lbs. during peak send-out. At other hours the pressure is less and during hours of small send-out, this line is under holder pressure.

The advantages of this method of distribution are:

(1) Reduction of pipe investment caused (a) by installing small pumping lines instead of large L. P. feeders and (b) the further reduction of same by using existing L. P. mains as pumping mains instead of laying new mains for that purpose.

(2) The future trunk line system may be planned years ahead and these plans can be

revised to compensate for unexpected developments.

(3) The pumping line is built in sections, and additions are made only when needed, so that the distribution system is not temporarily too large.

(4) Our experience indicates the unaccounted-for gas is reduced when pumping pressures as between one pound and 7½ pounds.

There are three boosters used to pump gas into the transmission pumping main. Each of these is direct driven by a horizontal or vertical steam engine. All of these can, when advisable be driven by a gas engine. This makes it possible to shut down the boiler plant in warm weather, as the company rarely manufactures gas, but purchases it from a coke oven plant.

COMPANY NO. 5

This company serves 1,000 consumers, sends out 30 million cu. ft. per year, and has a maximum daily send-out of 125 M. This company orignally distributed at low pressure only. Its main system became inadequate and for the past few years a motor driven fan booster has been used. The pressure is regulated by the adjustment of the fan by-pass valve. The fan has a capacity greater than the maximum send-out with a net boost of 12 inches. The motor is 3 H.P.

The fan does not pump directly into the L. P. system but into a converted 6 inch line running from the plant to the center of the business district, where it feeds the L. P. system through a governor. To convert this line, all L. P. mains with other sources of supply were cut loose, and all services connected to the pumping line, and to branch lines left under booster pressures, were equipped with governors. Only branch lines having no other supply mains are under booster pressure. This work was inexpensive and besides correcting pressure troubles allowed the use of both lifts of the holder, which previously had only one lift available for distribution.

COMPANY NO. 6

This Company originally served manufactured gas. All gas was distributed under low pressure from the plant in the west central part of the city. The maximum send-out of manufactured gas was about 600 M. per day.

In 1913 the distributing system was prepared to receive natural gas. The natural gas entered the east side of the town. By converting low pressure pipe to high pressure and occasionally adding a few blocks of new pipe a medium pressure belt line around the city was established. This passed the gas works so that the holder can be used for distributing when desirable.

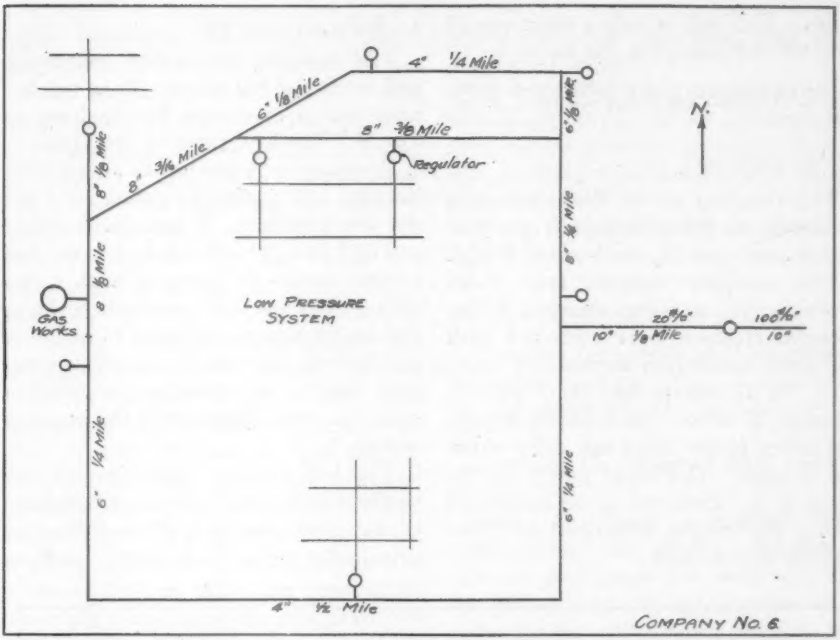
The natural gas is received at 100 lbs. when the supply is ample and is admitted into the belt line through a regulator at 20 lbs. pressure. It passes from the belt line through seven different regulators about the city into the low pressure system at 4 oz. pressure. This change from manufactured gas to natural gas cost very little and 3000 M per day has been distributed at satisfactory pressures to all consumers.

When the natural gas supply is exhausted it is planned to pump manufactured gas into the belt line from the holder at the opposite end of the town from that where the natural gas is received, and to distribute in the same manner now practiced for natural gas. Gas will also be fed into the low pressure system from the holder through a governor. During off-peak hours the belt line will be under holder pressure.

COMPANY NO. 7*

This company serves natural gas to 3300 consumers.

*This is similar to No. 6 except for method of operation during "off-peak" periods.



The gas is received at the city gates through a regulator into a belt line circling the city. The belt line delivers gas to the L. P. mains through seven district regulators spaced about equidistantly. Originally the belt line was under 25 lbs. pressure, and the L. P. system under 8 ozs. Now the send-out has fallen off, and to reduce leakage the belt line pressure has been reduced to 3 lbs. and the L. P. system to four inches. During off-peaks a man is sent to all regulators and reduces the belt line pressure to 1 lb. and the L. P. system to 2 inches.

COMPANY NO. 9

This company serves the city in which the gas works is located by means of a L. P. system only. Gas at 20 lbs. pressure is pumped to a holder in a small outlying city which is served from this holder by low pressure mains.

Consumers on the high pressure line between the cities are equipped with service governors.

Three Westinghouse air brake pumps do all of the pumping.

COMPANY NO. 10

This company serves 1,200 consumers. The annual send-out is 42 million and the maximum day send-out is 140M.

The distributing system of this company extends from the gas works eastward then southward and then westward again on the opposite side of a range of hills. The extreme end of the mains farthest from the works as measured by the distance the gas has traveled through the mains is only a short distance from the gas works when measured in a direct line. When the pressures need reinforcing it is planned to run a pumping main* from the plant over the hills to the present end of the

mains. This will be only a short run of pipe and will complete the circle.

*This pumping main will probably require a governor at its extreme end to feed into the L. P. system.

COMPANY NO. 12

This company serves 8000 consumers and sends out 270 million cu. ft. per year with a maximum day send-out of 950 M.

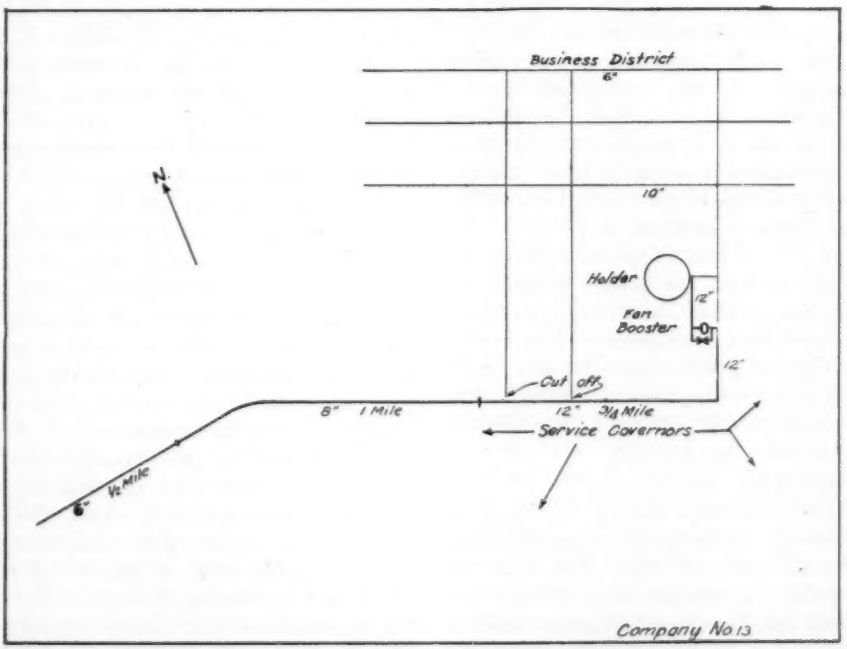
This company suffered from weak pressures in outlying districts. The pressure troubles were corrected with the same installation as that for Company No. 13, except that there are two boosters, a motor and a steam engine, and either of the latter can drive either fan booster. The horse power of the motor is 5. Pressures at all points are within the ranges prescribed in Commission Regulations.

COMPANY NO. 13

This company serves 6000 consumers and sends out 210 million cu. ft. per annum with a maximum day send-out of 950 M. The load factor is very poor.

Pressures were too low in an outlying district. All of the city mains were under low pressure. It was decided that it would be impracticable to correct this trouble simply by pumping with a fan blower into the low pressures main at the works, because in order to maintain the desired pressure in the weak pressure district, we would be compelled to carry too much pressure in the business section.

The low pressure main leaving the works was divided by a tee just outside of the yard, one main from it feeding principally the business district and the



other eventually furnishing the outlying district under consideration. A fan blower similar to those described was installed and its discharge was tied into the main supplying the district suffering with low pressure, and this line was isolated from that supplying the business district by cutting it off at the tee. The fan thus supplies this line alone, and when the fan is shut down, the line is put under holder pressure. As this line for a short distance runs parallel to that supplying the business district, all lines within a reasonable distance of the plant connecting the two were cut away from the line under booster pressure and the two ends plugged. There were only two or three such cuts to be made. We then were able to give good service in the outlying district without putting the business district under too much pressure, but when doing so, were forced to exceed the desired pressures in 125 services fairly near the works. This is being corrected by the installation of governors on these 125 services.

Other methods which could have been employed for correcting this trouble were adding large L. P. mains by laying a new transmission main or by converting existing L. P. mains to 3-7 pounds transmission mains and installing positive blowers and district governors. The work as done was much less costly than the last of these, which was the only other plan seriously considered, but which was finally abandoned because of insufficient funds.

By increasing the pumping pressure and enlarging the service governor district, we can increase our present booster's pumping rate when future conditions demand it.

The motor driving the fan booster is only 5 H. P.

COMPANIES NOS. 14 AND 15

Company 14 serves 1100 consumers, its annual send-out being 40 million cu. ft. and maximum day send-out of 130 M.

Company No. 15 serves 2500 consumers.

Both of these companies were equipped with low pressure distributing systems, and single lift holders. Both companies required more pressure at their plants. Additional pressure was furnished by installing in each case a fan booster on the holder outlet. These boosters are started at full speed with inlet, outlet and by-pass valves wide open. The street main pressure is then set and reset by adjusting and readjusting the opening of the by-pass valve by hand.

The only difference in the equipment of these companies is that company No. 14's booster is driven by a 2 h. p. turbine and company No. 15's by a 3 h. p. motor.

(Continued from page 332)

(1) sale of the available supply of gashouse coke; (2) briquetting of coke breeze from the beehive ovens at Sunnyside for domestic fuel; (3) burning of powdered coal where feasible; (4) installation of semi-experimental 100-ton plant for low temperature carbonization; (5) continuation of educational campaign to teach domestic consumers proper methods of firing the native coal.

Abstracts of Technical Articles of Interests to Gas Men

Contributed by Sub-committee on Abstracts* of the Chemical Committee

Determination of Tar, Dust and Moisture in Gas, Journal des Usines a Gaz, Vol. 46, No. 4, pp. 57 and 58. Laboratory procedure is given. The use of small pieces of glass tubing 5 mm. dia. and 5 mm. long as a filling for the tube for absorbing the tar is recommended. This makes the subsequent recovery of tar easy by washing out the absorption tube with benzol. (E. L. Hall.)

The Expansion at High Temperatures of Refractory Materials. Journal des Usines a Gaz. Vol. 46, No. 4, p. 52-54. A paper presented by M. Henry Le Chatelier before the Academy of Science. Covers research work on various refractories at temperatures up to 1500 deg. C. Silica expands rapidly up to 600 deg. C and very little above that temperature, a slight contraction takes place above 1000 deg. C. (E. L. Hall.)

Dry Gas Holders with Movable Diaphragm. Le Genie Civil, Vol. 80, No. 9, page 215. Brief description and sketch of gas holder having a horizontal diaphragm sliding vertically inside a tank. The gas is below the diaphragm and a seal is maintained between the diaphragm and tank by means of a trough around the edge of the diaphragm, kept filled with tar. Twenty of these holders, the largest about 60,000 cubic feet capacity, are said to be in successful operation. (E. L. Hall.)

The Hydrogenation of Naphthalene. By A. Mailhe, **Journal des Usiness a Gaz,** Vol. 46, No. 3, pp. 33 to 36. Review of laboratory results obtained in last 20 years on hydrogenation of hydrocarbons in presence of catalysts and under pressure. A process patented in Germany in 1918, and in use industrially is described, this consists of violently agitating liquid naphthalene and finely divided nickel in an autoclave. Hydrogen is introduced at 180° C and a pressure of 15 to 20 atmospheres maintained. The naphthalene is converted into tetrahydronaphthalene. This is soluble in most solvents and when so dissolved can be used as motor fuel. (E. L. Hall.)

Electrolysis, Research on Stray Currents, Journal des Usines a Gaz, Vol. 46, No. 3, pp. 40 to 42. Results of investigations of M. Chappuis and Desprez continued.

The Full Utilization of Bituminous Coal (Communicated) (Second Article. Gas Journal, Vol. 157, No. 3060, 28-30 (Jan. 4, 1922); **Gas World,** Vol. 76, No. 1955, 12-14 (Jan. 7, 1922). A discussion of the coke-forming factors is given in connection with a suggested method of procedure for the examination of coal to determine the most efficient way it can be used in gas manufacture. (George Moulton.)

The Co-operation of the Engineer and Chemist in the Control of Plants and Processes. By G. M. Gill, **Gas Journal,** Vol. 157, No. 3061, 82-86 (Jan. 11, 1922); **The Gas World,** Vol. 76, No. 1956, 22-26 (Jan. 14, 1922). The South Metropolitan Gas Company has found it advisable to carefully examine the coal used by chemical analysis and physical tests. It is suggested that if the colliery would grade the coal more carefully by means of such examination, the gas company could secure coal of more uniform quality. In regard to refractories, Mr. Gill points out that the workmanship and quality are poor and advises that the manufacturers could improve their product if more scientific methods of plant control were used. The gas manufactured by this company is under such control that the variations in quality have been reduced to a minimum. (George Moulton.)

Notes on "Pleno" Gas Plant and Processes. By George Helps, **Gas Journal,** Vol. 157, No. 3061, 82-86 (Jan. 11, 1922). Pleno gas refers to a gas of 400 B.t.u. (gross) or lower heating value made by diluting straight coal gas with blue water gas or producer gas. The operation of appliances with low heating value gases is discussed. (George Moulton.)

The Propagation of Flame in Mixtures of Ethylene and Air. By William Ronald Chapman, **Gas Journal,** Vol. 157, No. 3062, 158-159 (Jan. 18, 1922). The author, in addition to determining the velocity of flame propagation for ethylene-air mixture, shows how to calculate the maximum speed a coal gas-air mixture will have. (George Moulton.)

Some Notes on Complete Gasification and Combined Gas and Electricity Undertakings. By Harold Nielsen, **Gas Journal,** Vol. 157, No. 3064, 257-258 (Feb. 1, 1922). A

*Abstractors' names appear in parentheses following each item.

thermal balance sheet is given and the suggestion made that the blue gas be used in the generation of electrical energy. (George Moulton.)

Ammonia and Its Stability in the Coke Oven. Paper read by H. J. Hodsman, **Gas Journal,** Vol. 157, No. 3068, 510-513 (March 1, 1922); **Gas World,** Vol. 76, No. 1959, 10-13 (Feb. 4, 1922). The loss of ammonia is due to dissociation at the coke-oven temperatures, oxidation, formation of cyanides, and nitrogen compounds of tar. (George Moulton.)

Experimental Sulphate Neutralizing Plant at Langly Park. Paper by T. Johnson, **Gas World,** Vol. 76, No. 1963, 14-17 (March 4, 1922). The plant is described and some experimental results are given. (George Moulton.)

Contribution to the Theory of the Water-Gas Process. By S. Kohn. **Jour. Ind. and Eng. Chem.,** Vol. 14, No. 1, 69-72 (Jan. 1922). Enumerates possible reactions of carbon and steam in water-gas formation and further develops the relations of the volumes of H_2, Co and CO_2. Some discussion of effects of catalysts follows. (C. A. Schnerr.)

The Flow of Liquids Through Commercial Pipe Lines. By Robert E. Wilson, W. H. McAdams and M. Seltzer. **Jour. Ind. and Eng. Chem.,** Vol. 14, No. 2, 105-119 (Feb. 1922). An elaborate research on flow of liquids in pipes. (C. A. Schnerr.)

The Physiological Principles Governing Ventilation When the Air is Contaminated with Carbon Monoxide. By Zandell Henderson and Howard W. Haggard, **Jour. Ind. and Eng. Chem.,** Vol. 14, No. 3, 229-236 (March, 1922). This article, relative to physiological effects of carbon monoxide in atmospheres, was written in connection with underground ventilation for the removal of partially burned gases, but it should prove of great interest to the gas industry where small amounts of carbon monoxide might be suspected from leakage or incomplete combustions. A bibliography relative to the subject is incorporated. (C. A. Schnerr.)

Tests of an Iodine Pentoxide Indicator for Carbon Monoxide. By S. H. Katz and J. J. Bloomfield, **Jour. Ind. and Eng. Chem.,** Vol. 14, No. 4, 304-306 (April, 1922). (C. A. Schnerr.)

Removing S from Gas by NaOCl. By H. R. Broker and O. L. Kowalke, **Gas Age Record,** Vol. 49, No. 13, 386 (April 1, 1922). Extracts from a Wisconsin Gas Association paper on the removal of sulphur compounds from manufactured gas by means of sodium hypochlorite. (J. M. Brodbeck.)

By-Product Coke Oven Statistics. By R. S. McBride, **Gas Age Record,** Vol. 49, No. 14, 431 (April 8, 1922). United States Geological Survey of 1921 shows that by-product coking of bituminous coal is exceeding that of the Beehive Oven Industry. (J. M. Brodbeck.)

Removing Naphthalene from Gas. By O. L. Kowalke and A. W. Pesch, **Gas Age Record,** Vol. 49, No. 14, 433 (April 8, 1922). By preventing its formation during the process of carbonization. Separating it from the gas in the condensing and cooling apparatus. By washing the gas with a solvent, and by adding a solvent to the purified gas. (J. M. Brodbeck.)

Continuous Oil-Water-Coal Gas. By F. C. Cornet, **Gas Age Record,** Vol. 49, No. 15, 455 (April 15, 1922). A process which has been experimented with in Europe. Using powdered coal as gas making fuel. Gas efficiency claimed of 64 to 66 per cent. (J. M. Brodbeck.)

Finding Sulfur Content in Oxide. By C. E. Little, **Gas Age Record,** Vol. 49, No. 15, 463 (April 15, 1922). Proposed method to make possible more exact results in extraction of sulfur, also importance of making careful determination. (J. M. Brodbeck.)

(Following Abstracts selected from Chemical Abstracts by E. C. Uhlig)

Testing Air. By L. A. Levy and R. H. Davis. Brit. 171, 739. (July 20, 1920). App. for the detection and estn. of CO in air comprises a chamber contg. a drying agent such as $CaCl_2$ granules, a reagent, catalytic or otherwise, for oxidizing the CO, and a thermometer; the air to be tested is passed in definite vols. or at a standard rate through the app. and while therein is dried, the CO is then oxidized, and finally the air flows past the thermometer, which indicates the increase of temp. due to the oxidation and gives the desired record.

New Apparatus for Technical Gas Analysis and for Rapid Determination of Ammonia in Waste Liquor. By H. M. Lowe, **J. Soc. Chem. Ind.** 41, 11-2T (1922). In an ordinary lab. gas analysis app. the Bunte burette and the Hempel explosion and absorption pipette are connected by a 3-way stopcock, the 3rd limb being used for admitting and expelling the gas and reagents. A new use for it is the analysis of waste NH_3 liquors by decompn. with NaOBr. This operation requires about 5 min.

Works Practice on By-Products. By E. Nelson, **Gas World,** 76, 49-50; **Gas Jour.** 157, 211 (1922). A lecture on tar and its constituents covering distn., rectification and working up of by-products.

Deposit in Steel Pipes. By J. J. Scott, **Gas Jour.** 156, 750-1 (1921); **Gas World** 75, 545-7 (1921). Various analyses of the deposits in gas mains lead to the conclusion that the cause thereof is the combined action of free O and CN. This is in agreement with the work of Taplay and Parkinson (C. A. 15, 3384). In spots where the interior of the pipes is protected by oil, there has been no trouble. Oil-spraying, however, is only a palliative, and where there are deposits the oil might cause these deposits to become more troublesome. The real cure will be the removal of the pernicious constituents at the works.

Sensible Heat Low-Temperature Distillation in Rotary Retorts. By H. Nielsen, **Gas Jour.**, 156, 444-5 (1921). The av. analysis of the town's gas produced in the Nielsen rotary retort (C. A. 16, 331) is CO_2 3.37 per cent, CO 38.07, CH_4 9.59, C_nH_m 1.2, H_2 43.9, O_2 0.15 and N_2 3.72. The capital cost of a plant capable of dealing with 100 tons of bituminous slack per 24 hours, and producing 3.5 million cu. ft. of about 400 B.t.u. gas will be about 35,000 (Pounds).

Viscosities and Pour Tests of Typical Crude Oils from the Eastern and Rocky Mt. Producing Fields of the U. S. By E. W. Dean, A. D. Bauer and W. B. Lerch, **Bur. Mines, Repts. Invest.** No. 2290, 5 pp. (1921). The Saybolt Universal viscosimeter was used for virtually all viscosities at temps. of 70 degrees and 100 degrees F. The A.S.T.M. standard method was used for the pour tests. Eastern crudes gave much more uniform viscosities, only a few cases being outside a range from 35 to 60 sec. Saybolt at either temp., while over half the results on Rocky Mountain were outside this range. The same is true of the pour tests, crudes from Eastern fields being more uniform than those from the West. Tables give all results.

Rate of Carbonization of Coal. By G. Weyman, **Gas Jour.** 156, 383-4 (1921); **Colliery Guardian** 122, 1405-6 (1921).

Addition of Flue Gas in the Generator Process in Gas Works. By J. Hudler, **Gas und Wasserfach** 64, 475-79 (1921); c.f. Gwosdz, C. A. 15, 1389; Essisch, C. A. 15, 587. H. discusses the effects of adding to the generator air, flue gas at 1100 degrees, at 60 degrees, no flue gas, 50 per cent of steam, and flue gas at 0 degrees. The available amts. of effective heat per kg. of C decreases in the above order. By introducing flue gases into the generator an economy of 10 per cent or more is possible.

Reports of the Gas Investigation Committee. Anon. **Gas World** 75, 289-92 (1921). A summary of five years' work is given. Cf. C. A. 13, 507, 1918; 14, 2408, 2409; 15, 2709, 3195.

Chamber Ovens with Central Generators for Small Gas Works. By H. Kleinholz, **Gas und Wasserfach** 64, 619-23 (1921). The gas plant at Haspe consisting of 6 Otto vertical chamber ovens with a central generator is described. It has a capacity of 3000 cu. m. of gas per day. Its operation proves that a central generator plant is entirely practical for small gas works.

Tar Distillation and Sulphate of Ammonia Manufacture. By Fred J. West, **Gas Jour.** 156, 231-3 (1921); **Gas World** 75, 343-5 (1921). Descriptions are given of plants for the distn. of tar and the manuf. of $(NH_4)_2SO_4$ constructed by the Chemical Engineering and Wilton's Patent Furnace Co., R. & J. Dempster, W. C. Holmes & Co. (the Hird tar plant), and C. & W. Walker. The paper was prepared by the Society of British Gas Industries (cf. C. A. 14, 2410).

The Coking of Utah Coals. By S. W. Parr and T. E. Layng, **Bur. of Mines, Repts. of Investigations** 2278, 13 pp. (1921).

Possible Economies in Coke and By-Product Works with Special Consideration of Heat Savings. By W. Wallenweber, **Stahl u. Eisen** 41, 1453 (1921). The losses due to high water content of the coal and high C content of the ash are pointed out and methods of lessening them discussed.

Industrial and Domestic Uses of Coke. By E. W. L. Nicol, **Gas World** 75, 272-4 (1921); **Iron & Coal Trades Rev.** 103, 471 (1921). The use of coke is of advantage for both domestic and industrial uses with its elimination of smoke, its favorable bearing on public hygiene, and its financial saving. The "sandwich system" (C. A. 13, 897) for burning mixed fuels under boilers is being installed in numerous plants.

Factors Affecting the Stability and Inversion of Oil-Water Emulsions. By Leon W. Parsons and O. G. Wilson, Jr., **J. Ind. Eng. Chem.** 13, 1116-23 (1921). Emulsions prepd. from "Nujol" (white pharmaceutical oil) by various emulsifying agents have been studied. The inversion of phases in oil-in-water emulsions (sol. soaps as emulsifying agents) was effected by metathesis by $MgSO_4$, $MgCl_2$, $FeSO_4$, $Al_2(SO_4)_3$, and $FeCl_3$.

The Effects of Gases on Men and the Treatment of Various Forms of Gas Poisoning. By Y. Henderson, **Bur. of Mines, Tech. Paper No. 248**, pp. 51-9 (1921).

Classified Directory--Manufacturers of Gas Equipment

Company Members Only, American Gas Association, Inc.

ARC LAMPS (Gas)
General Gas Light Co., New York, N. Y., Kalamazoo, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Welsbach Co., Gloucester, N. J.

ASBESTOS AND MAGNESIA PRODUCTS
Johns-Manville Inc., Madison Ave. and 41st St., New York, N. Y.

BAGS (Gas Main)
Safety Gas Main Stopper Co., 943 Fulton St., Brooklyn, N. Y.

BENCHES
Bartlett Hayward Co., The, Baltimore, Md.
Gas Machinery Co., Inc., The, Cleveland, Ohio
J. H. Gautier & Co., Jersey City, N. J.
Missouri Fire Brick Co., St. Louis, Mo.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Riter-Conley Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.

BENCH IRON WORK
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Bartlett Hayward Co., The, Baltimore, Md.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Equipment Co., The, 24 State St., New York, N. Y.
Isbell-Porter Co., Newark, N. J.
Missouri Fire Brick Co., St. Louis, Mo.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Riter-Conley Company, Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Stacey Manufacturing Co., The, Cincinnati, Ohio.
Western Gas Construction Co., The, Fort Wayne, Ind.

BLAST GATES
B. F. Sturtevant Co., Inc., Boston, Mass.

BLOWERS, BOOSTERS, EXHAUSTERS
American Gas Construction Co., Newton, Ia.
American Gas Furnace Co., Elizabeth, N. J.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Connersville Blower Co., The, Connersville, Ind.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Isbell-Porter Co., Newark, N. J.
C. M. Kemp Mfg. Co., The, Baltimore, Md.
Maxon Furnace and Engineering Co., Muncie, Ind.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
Russell Engineering Co., St. Louis, Mo.
Needham Gas Appliance Co., The Passaic, N. J.
B. F. Sturtevant Company, Hyde Park District, Boston, Mass.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.
Wilbraham-Green Blower Co., Pottstown, Pa.

BOILERS (Gas)
Bryant Heater & Mfg. Co., The, Cleveland, Ohio, Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Gallaher Boiler Co., Laclede Gas Bldg., St. Louis, Mo.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Hugo Manufacturing Co., West Duluth, Minn.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Kidde & Co., 103 Park Ave., New York, N. Y.
National Machine Works, Sheffield & North Ave., Chicago, Ill.
Ofeldt Gas Fired Boiler Co., Inc., The, Nyack-on-the-Hudson, N. Y.
Wales Co., The, Kalamazoo, Mich.

BOILERS (Gas for House Heating)
American Radiator Co., New York, N. Y., Chicago, Ill.
Bryant Heater & Mfg. Co., The, Cleveland, Ohio, Chicago, Ill.
Gallaher Boiler Co., Laclede Gas Bldg., St. Louis, Mo.
Kidde & Co., 103 Park Ave., New York, N. Y.
Wales Co., The, Kalamazoo, Mich.

BOILERS (Waste Heat)
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
U. G. I. Contracting Co., The, Broad and Arch Sts., Philadelphia, Pa.

BRAKE AND FRICTION MATERIALS
Johns-Manville Inc., Madison Ave. and 41st St., New York, N. Y.

BRAZING TABLES
American Gas Furnace Co., Elizabeth, N. J.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Rathbone, Sard & Co., Albany, N. Y.

BRICK, FIREBRICK
Gas Machinery Co., Inc., The, Cleveland, Ohio
J. H. Gautier & Co., Jersey City, N. J.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Improved Equipment Co., The, 24 State St., New York, N. Y.
Missouri Fire Brick Co., St. Louis, Mo.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Russell Engineering Co., St. Louis, Mo.

BROILERS (Hotel)
American Stove Co., St. Louis, Mo.
Geo. M. Clark & Co., Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
De Matteis Broiler System Co., Inc., The, New York, N. Y.
Fuller-Warren Co., The Milwaukee, Wiss.
Michigan Stove Co., The, Detroit, Mich.
Rathbone, Sard & Co., Albany, N. Y., Aurora, Ill.
Geo. D. Roper Corp., Rockford, Ill.

BURNERS (Industrial)
American Gas Appliance Co., 103 Lawrence St. Brooklyn, N. Y.
American Gas Furnace Co., Elizabeth, N. J.
Baltimore Gas Appliance & Mfg. Co., The, Baltimore, Md.

BURNERS (Industrial)—(Continued)
Century Stove & Mfg. Co., Johnstown, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Fuller-Warren Co., The, Milwaukee, Wis.
Grinnell Co., Inc., Providence, R. I.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Hale Manufacturing Co., Chicago, Ill.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Hugo Manufacturing Co., West Duluth, Minn.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa.
C. M. Kemp Mfg. Co., The, Baltimore, Md.
Maxon Furnace & Engineering Co., The, Muncie, Ind.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Needham Gas Appliance Co., The, Passaic, N. J.
Geo. D. Roper Corp., Rockford, Ill.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.
Tappan Stove Co., The, Mansfield, Ohio
A. H. Wolff Gas Radiator Co., The, 4 Great Jones St., New York, N. Y.

BURNERS (Lighting)
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
General Gas Light Co., New York, N. Y., Kalamazoo, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Lindsay Light Co., New York, N. Y., Chicago, Ill.
Welsbach Co., Gloucester, N. J.

BY-PRODUCT OVENS
Belgian American Coke Ovens Corp., St. Louis, Mo.
By-Products Coke Corp., Chicago, Ill.
Foundation Oven Corp., Woolworth Bldg., New York, N. Y.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Equipment Co., The, 24 State St. New York, N. Y.
Koppers Co., The, Pittsburgh, Pa.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Semet-Solvay Co., Syracuse, N. Y.

BY-PRODUCT RECOVERY APPARATUS
Bartlett Hayward Co., The, Baltimore, Md.
Foundation Oven Corp., Woolworth Bldg., New York, N. Y.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Koppers Co., The, Pittsburgh, Pa.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

CALORIMETERS
American Meter Co., Inc., New York, N. Y.
Lambert Meter Co., Inc., Bush Terminal Bldg., Brooklyn, N. Y.
Maryland Meter Works, Baltimore, Md.
D. McDonald & Co., Albany, N. Y.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.
Superior Meter Co., Bush Terminal Bldg., Brooklyn, N. Y.

CASING, TUBING (Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

CASTINGS (Brass, Grey Iron)
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Bartlett Hayward Co., The, Baltimore, Md.
Cleveland Co-Operative Stove Co., The, Cleveland, Ohio
Howard Stove Co., Beaver Falls, Pa.
S. B. Sexton Stove & Mfg., The, Baltimore, Md.
Western Gas Construction Co., The, Fort Wayne, Ind.

CEMENT, HIGH TEMPERATURE
Johns-Manville, Inc., Madison Ave. & 41st St., New York, N. Y.
Missouri Fire Brick Co., St. Louis, Mo.
Quigley Furnace Specialties Co., 26 Cortlandt
Russell Engineering, St. Louis, Mo.
St., New York, N. Y.

CHARGING COAL
Bartlett Hayward Co., The, Baltimore, Md.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Phillips, Lang & Co., Chicago, Ill.
Western Gas Construction Co., The, Fort Wayne, Ind.

CLOTHES DRYERS
Canton Clothes Dryer Co., The, Canton, Ohio.

CHIMNEYS (Radical Brick)
Alphons Custodis Chimney Construction Co., Marquette Bldg., Chicago, Ill.

COAL AND COKE (Conveyors, Crushers, Screeners)
Bartlett Hayward Co., The, Baltimore, Md.
R. H. Beaumont Co., 315 Arch St., Philadelphia, Pa.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Phillips, Lang & Co., Chicago, Ill.
Riter-Conley Company, Pittsburgh, Pa.
Stephens-Adamson Mfg. Co., Aurora, Ill.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.

COAL TAR PRODUCTS & CHEMICALS
Barrett Company, The, 17 Battery Place, New York, N. Y.

COCKS (Ranges, Water Heaters, Service and Meter)
A-B Stove Co., Battle Creek, Mich.
Acme Brass Works, Detroit, Mich.
Aws Mfg. Co., The, 398 Harman St., Brooklyn, N. Y.
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Detroit Brass & Malleable Works, Detroit, Mich.
Geo. D. Roper Corp., Rockford, Ill.
Hays Mfg. Co., Inc., Erie, Pa.
H. Mueller Mfg. Co., New York, N. Y., Decatur, Ill.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Kitson Co., 2837 Oakford St., Philadelphia, Pa.
McRae & Roberts Co., The, Detroit, Mich.
Peninsular Brass Works, Detroit, Mich.
Roberts Brass Mfg. Co., The, Detroit, Mich.
Standard Brass Works, Detroit, Mich.

COMPOUND FOR CLEANING GAS METERS AND GAS STOVES
Standard Chemical & Supply Co., Cambridge A, Mass.

COMPRESSORS
American Gas Construction Co., Newton, Ia.
C. M. Kemp Mfg. Co., The, Baltimore, Md.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Surface Combustion Co., The 366 Gerard Ave., Bronx, N. Y.

CONDENSERS
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
Cruse-Kemper Co., Ambler, Pa.
M. T. Davidson Co., 154 Nassau St., New York, N. Y.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co. Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Isbell-Porter Co., Newark, N. J.
Riter-Conley Company, Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Stacey Bros. Gas Construction Co., The, Cincinnati, Ohio
Stacey Manufacturing Co., The, Cincinnati, Ohio.

Steere Engineering Co., Detroit, Mich.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

COOKING AUXILIARIES
G. S. Blodgett Co., The, Burlington, Vt.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Duparquet, Huot & Moneuse Co., 108 W. 22nd St., New York, N. Y.
Fuller-Warren Co. The, Milwaukee, Wis.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Geo. D. Roper Corp., Rockford, Ill.
Scott Gas Appliance Co., Bond Bldg., Washington, D. C.

COUPLINGS
S. R. Dresser Mfg. Co., Bradford, Pa.

COVERINGS (Cold Pipe, Steam Pipe, Tank and Boiler)
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Johns-Manville Inc., Madison Ave. and 41st St., New York, N. Y.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

DECALCOMANIA PRODUCTS
Meyercord Co., Inc., The, Chamber of Commerce Bldg., Chicago, Ill.

ELECTRIC CONTROLLING DEVICES
Cutler-Hammer Mfg. Co., The, Milwaukee, Wis., New York, N. Y.

ELEVATORS
Craig Ridgway & Son Co., Coatesville, Pa.
Phillips, Lang & Co., Chicago, Ill.

EXCHANGES (Heat)
Bartlett Hayward Co., The, Baltimore, Md.
Riter-Conley Co., Pittsburgh, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

EXPERT APPRAISAL
Steere Engineering Co., Detroit, Mich.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.

EXTRACTORS (Tar, Dust, Fumes)
Bartlett Hayward Co., The, Baltimore, Md.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Isbell-Porter Co., Newark, N. J.
Russell Engineering Co., St. Louis, Mo.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

FITTINGS
A-B Stove Co., Battle Creek, Mich.
Acme Brass Works, Detroit, Mich.
Aws Manufacturing Co., New York, N. Y.
Bartlett Hayward Co., The, Baltimore, Md.
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Davis & Farnum Mfg. Co., Waltham, Mass.
Detroit Brass & Malleable Works, Detroit, Mich.
S. R. Dresser Mfg. Co., Bradford, Pa.
Eriez Stove & Mfg. Co., Erie, Pa.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Kitson Co., 2827 Oakford St., Philadelphia, Pa.
McRae & Roberts Co., The, Detroit, Mich.
H. Mueller Mfg. Co., New York, N. Y., Decatur, Ill.
Peninsular Brass Works, Detroit, Mich.
Roberts Brass Mfg. Co., The, Detroit, Mich.
Geo. D. Roper Corp., Rockford, Ill.
Standard Brass Works, Detroit, Mich.
Welsbach Co., Gloucester, N. J.
Western Gas Construction Co., The, Fort Wayne, Ind.

FITTINGS (Malleable Iron)
Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Geo. D. Roper Corp., Rockford, Ill.

FLASHLIGHTS AND BATTERIES
French Battery & Carbon Co., Madison, Wis.

FLEXIBLE TUBING AND ENDS
Atlantic Tubing Co., Providence, R. I.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eastman Mfg. Co., Manitowoc, Wis.

FORGES
American Gas Furnace Co., Elizabeth, N. J.
B. F. Sturtevant Co., Inc., Boston, Mass.

FUEL BRIQUETTING
Foundation Oven Corp., Woolworth Bldg., New York, N. Y.

FUEL ECONOMIZERS
B. F. Sturtevant Co., Inc., Boston, Mass.

FURNACES
American Gas Furnace Co., Elizabeth, N. J.
Century Stove & Mfg. Co., Johnstown, Pa.
Eriez Stove & Mfg. Co., Erie, Pa.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Maxon Furnace and Engineering Co., Muncie, Ind.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Needham Gas Appliance Co., The, Passaic, N. J.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Russell Engineering Co., St. Louis, Mo.
S. B. Sexton Stove & Mfg. Co., The, Baltimore, Md.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.

FUSES
Johns-Manville Inc., Madison Ave. and 41st St., New York, N. Y.

GAS COAL PRODUCERS
Amherst Fuel Co., Cincinnati, O.
Creech Coal Co., 733 Union Trust Bldg., Cincinnati, Ohio.
Harlan Co-operative Coal Co., Lexington, Ky.

GAS ENGINES
Bartlett Hayward Co., The, Baltimore, Md.
B. F. Sturtevant Co., Inc., Boston, Mass.

GAS ENGINE COCKS AND VALVES
Standard Brass Works, Detroit, Mich.

GAS IRONS
A-B Stove Co., Battle Creek, Mich.
Benson Mfg. Co., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Strause Gas Iron Co., Philadelphia, Pa.

GAS LEAK INDICATORS
Taylor Instrument Companies, Rochester, N. Y.

GAS LOGS
Strait & Richards, Inc., Newark, N. J.

GAS MAIN BAGS AND GAS MAIN STOPPERS
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Safety Gas Main Stopper Co., 943 Fulton St., Brooklyn, N. Y.

GAS MIXERS
American Gas Furnace Co., Elizabeth, N. J.
Century Stove & Mfg. Co., Johnstown, Pa.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Brass & Malleable Works, Detroit, Mich.
Eriez Stove & Mfg. Co., Erie, Pa.
Fuller-Warren Co., The, Milwaukee, Wis.
Grinnell Co., Inc., Providence, R. I.
Hale Manufacturing Co., Chicago, Ill.
Hays Manufacturing Co., Inc., Erie, Pa.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa.
C. M. Kemp Mfg. Co., The, Baltimore, Md.
Maxon Furnace & Engineering Co., Muncie, Ind.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
Geo. D. Roper Corp., Rockford, Ill.
Strait & Richards, Inc. Newark, N. J.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.

GAS PLANTS (Blue)
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Improved Equipment Co., The, 24 State St., New York, N. Y.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

GAS PLANTS (OIL)
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.

GAS PLANTS (Carburetted Water)
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Equipment Co., The, 24 State St., New York, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Stacey Manufacturing Co., The, Cincinnati, Ohio
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

GAS PLANTS (Coal) (Engineers)
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Equipment Co., The, 24 State St., New York, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Isbell-Porter Co., Newark, N. J.
Missouri Fire Brick Co., St. Louis, Mo.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Riter-Conley Company, Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Semet-Solvay Co., Syracuse, N. Y.
Stacey Manufacturing Co., The, Cincinnati, Ohio
Stacey Bros. Gas Construction Co., The, Cincinnati, Ohio
Steere Engineering Co., Detroit, Mich.
U. G. I Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

GAS RANGE WATER HEATERS
Elliott Water Heater Co., Inc., 1246 Myrtle Ave., Brooklyn, N. Y.
Geo. D. Roper Corp., Rockford, Ill.

GOVERNORS, PRESSURE VACUUM & PUMP
American Gas Construction Co., Newton, Ia.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.

HEATERS (Room)
American Stove Co., St. Louis Mo.
Baltimore Gas Appliance & Mfg. Co., Baltimore, Md.
Century Stove & Mfg. Co., Johnstown, Pa.
Geo. M. Clark & Co., Div. Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., Hamilton, Ohio
General Gas Light Co., New York, N. Y., Kalamazoo, Mich.
Grinnell Co., Inc., Providence, R. I.
J. H. Grayson Mfg. Co., The, Athens, Ohio
Hugo Manufacturing Co., West Duluth, Minn.
Illinois Specialty Mfg. Co., Bloomington, Ill.
Kidde & Co., 103 Park Ave., New York, N. Y.
Kennedy-Toombs, Inc., 12 Eleventh Ave., New York, N. Y.
Lawson Mfg. Co., Pittsburgh, Pa.
New Process Stove Co., Div., Cleveland, Ohio
Ohio State Stove & Mfg. Co., The, Columbus, Ohio
Reliable Stove Co. Div., Cleveland, Ohio
Reznor Mfg. Co., Mercer, Pa.
Roberts & Mander Stove Co., Philadelphia, Pa.
Sanitary Heating Co., The, 233-37th St., Brooklyn, N. Y.
J. B. Slattery & Bro. Inc., 108-110 Lawrence St., Brooklyn, N. Y.
Strait & Richards, Inc., Newark, N. J.
B. F. Sturtevant Co., Inc., Boston, Mass.
Van Zandt Gas Appliance Co. St. Louis, Mo.
Welsbach Co., Gloucester, N. J.
Western Gas Construction Co., The, Fort Wayne, Ind.
Wheeling Corrugating Co., Wheeling, W. Va.
A. H. Wolff Gas Radiator Co., The, 4 Great Jones St., New York, N. Y.

HEATERS (Garage)
Gallaher Boiler Co., Laclede Gas Bldg., St. Louis, Mo.
Howard Stove Co., Beaver Falls, Pa.
Kidde & Co., 103 Park Ave., New York, N. Y.
B. F. Sturtevant Co., Inc., Boston, Mass.
Wales Co., The, Kalamazoo, Mich.

HEATERS (Pressing and Soldering Irons)
American Gas Furnace Co. Elizabeth, N. J.
Amercian Stove Co., St. Louis, Mo.
Bryant Heater & Mfg. Co., The, Cleveland, Ohio, Chicago, Ill.
Geo M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
Estate Stove Co., Hamilton, Ohio
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Ceder Rapids, Iowa
Strait & Richards, Inc., Newark, N. J.

HIGH PRESSURE SYSTEMS
American Gas Construction Co., Newton, Ia.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Connersville Blower Co., The, Connersville, Ind.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
C. M. Kemp Mfg. Co., The, Baltimore, Md.
H. Mueller Mfg. Co., New York N. Y., Decatur, Ill.
Needham Gas Appliance Co., The, 1 S. Lafayette St., New York, N. Y.
Selas Co., Philadelphia, Pa.
Surface Combustion Co., The, 366 Gerard Ave. Bronx, N. Y.

HOLDERS (Structural Steel Works)
American Gas Construction Co., Newton, Ia.
Banner Iron Works, 4560 Shaw Ave., St. Louis Mo.

Bartlett Hayward Co., The, Baltimore, Md.
Cruse-Kemper Co., Ambler, Pa.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Riter-Conley Company, Pittsburgh, Pa.
Stacey Bros. Gas Construction Co., The, Cincinnati, Ohio
Stacey Manufacturing Co., The, Cincinnati, Ohio
Western Gas Construction Co., The, Fort Wayne, Ind.

HOT PLATES
American Stove Co., St. Louis, Mo.
A-B Stove Co., Battle Creek, Mich.
Baltimore Gas Appliance & Mfg. Co., The, Baltimore, Md.
Century Stove & Mfg. Co., Johnstown, Pa.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Elgin Stove & Oven Co., Elgin, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Fuller-Warren Co., The, Milwaukee, Wis.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Howard Stove Co., Beaver Falls, Pa.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Michigan Stove Co., The, Detroit, Mich.
Ohio State Stove & Mfg. Co., The, Columbus, Ohio
Rathbone, Sard & Co., Albany, N. Y., Aurora, Ill.
J. B. Slattery & Bro., Inc., 108-110 Lawrence St., Brooklyn, N. Y.
Tappan Stove Co., The, Mansfield, Ohio
Union Stove Works, 20 Beekman St., New York, N. Y.
Weir Stove Co., Taunton, Mass.
Wheeling Corrugating Co., Wheeling, W. Va.
A. H. Wolff Gas Radiator Co., The, 4 Great Jones St., New York, N. Y.

INDUSTRIAL FLOORING
Johns-Manville Inc., Madison Ave. and 41st St., New York, N. Y.

IRONING MACHINES
American Ironing Machine Co., 168 N. Michigan Ave., Chicago, Ill.

INCINERATORS
Estate Stove Co., Hamilton, Ohio
Odorless Incinerator Co., Philadelphia, Pa.
Ruud Mfg. Co., Pittsburgh, Pa.

INSTRUMENTS (Measuring, Testing and Recording)
American Meter Co., Inc., New York, N. Y.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, Ohio
Bristol Co., The, Waterbury, Conn.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Foxboro Co., Inc., The, Foxboro, Mass.
Lambert Meter Co., Inc., Bush Terminal Bldg., Brooklyn, N. Y.
Maryland Meter Works, Baltimore, Md.
D. McDonald & Co., Albany, N. Y.
Precision Instrument Co., 21 Halsey St., Newark, N. J.
Republic Flow Meters Co., 2240 Diversey Blvd., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., The, Brooklyn, N. Y.
Steere Engineering Co., Detroit, Mich.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Taylor Instrument Companies, Rochester, N. Y.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

INSULATING MATERIALS
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Celite Products Co., 11 Broadway, New York, N. Y.
Davis & Farnum Mfg. Co., Waltham, Mass.
Johns-Manville Inc., Madison Ave. and 41st St., New York, N. Y.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York, N. Y.

KILNS (For Firing Glass, China and Pottery)
B. F. Drakenfeld & Co., Inc., 50 Murray St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Russell Engineering Co., St. Louis, Mo.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.

KILNS
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Russell Engineering Co., St. Louis, Mo.
B. F. Sturtevant Co., Inc., Boston, Mass.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.

LABORATORY (Flash and Fire Test Apparatus)
Taylor Instrument Companies, Rochester, N. Y.

LIGHTERS (Ranges)
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Michigan Stove Co., The Detroit, Mich.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Geo. D. Roper Corp., Rockford, Ill.
Safety Gas Lighter Co., Lynn, Mass.
J. M. Sherwood Co., New York, N. Y.
Strause Gas Iron Co., Philadelphia, Pa.
Welsbach Co., Gloucester, N. J.

LIGHTING (Fixtures)
Salem Brothers, 122 Centre St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Gas Domes, Portables, etc.)
Kramer Bros. Lamp Co., 585 Broadway, New York, N. Y.
Royal Art Glass Co., 243 Canal St., New York, N. Y.
Salem Brothers, 122 Centre St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Glassware)
Salem Brothers, 122 Centre St., New York, N. Y.
Welsbach Co., Gloucester, N. J.

LIGHTING (Incidentals)
Storrs Mica Co., Owego, N. Y.

LIGHTING (Mantles)
General Gas Light Co., New York, N. Y., Kalamazoo, Mich.
Lindsay Light Co., New York, N. Y., Chicago, Ill.
Welsbach Co., Gloucester, N. J.

LUX MATERIAL
Alpha-Lux Co., Inc., 192 Front St., New York, N. Y.

METAL RECEPTACLES
American Gas Furnace Co., Elizabeth, N. J.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Charles A. Hones, Inc., Baldwin, Long Island, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.
United Lead Co., 111 Broadway, New York, N. Y.

METERS
American Meter Co., Inc., New York, N. Y.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, Ohio
Cleveland Gas Meter Co., Cleveland, Ohio
Connersville Blower Co., The, Connersville, Ind., New York, N. Y.
Cutler-Hammer Mfg. Co., The, Milwaukee, Wis., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Foxboro Co., Inc., The, Foxboro, Mass.
John J. Griffin & Co., 1513 Race St., Philadelphia, Pa.
Helme & McIlhenny, 17th and Clearfield Sts., Philadelphia, Pa.
Lambert Meter Co., Inc., Bush Terminal Bldg., Brooklyn, N. Y.
D. McDonald & Co., Albany, N. Y.
Maryland Meter Works, Baltimore, Md.
Metric Metal Works, Erie, Pa.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.
Pittsburgh Meter Co., East Pittsburgh, Pa.
Precision Instrument Co., 21 Halsey St., Newark, N. J.
Republic Flow Meters Co., 2240 Diversey Blvd., Chicago, Ill.
Rotary Meter Co., 52 Vanderbilt Ave., New York, N. Y.
Sprague Meter Co., The, Bridgeport, Conn.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Taylor Instrument Companies, Rochester, N. Y.

METERS (Air and Steam)
Pittsburgh Meter Co., East Pittsburgh, Pa.
Republic Flow Meters Co., 2240 Diversey Blvd., Chicago, Ill.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.

METER CONNECTIONS, SEALS, Etc.
American Meter Co., Inc., New York, N. Y.
Cleveland Gas Meter Co., Cleveland, Ohio
S. R. Dresser Mfg. Co., Bradford, Pa.
Equitable Meter Co., Pittsburgh, Pa.
Helme & McIlhenny, 17th and Clearfield Sts., Philadelphia, Pa.
Lattimer Stevens Co., The, Columbus, Ohio
D. McDonald & Co., Albany, N. Y.
H. Mueller Mfg. Co., New York, N. Y., Decatur, Ill.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.
Pittsburgh Meter Co., East Pittsburgh, Pa.
Sprague Meter Co., The, Bridgeport, Conn.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.

METERS (Steam, Condensation, Gasoline, Oil, Hot and Cold Water)
Pittsburgh Meter Co., East Pittsburgh, Pa.
Republic Flow Meters Co., 2240 Diversey Blvd., Chicago, Ill.

METER PROVERS
American Meter Co., Inc., New York N. Y.
Equitable Meter Co., Pittsburgh, Pa.
John J. Griffin & Co., Philadelphia, Pa.
Helme & McIlhenny, 17th and Clearfield Sts., Philadelphia, Pa.
Lambert Meter Co., Inc., Bush Terminal Bldg., Brooklyn, N. Y.
Maryland Meter Works, Baltimore, Md.
D. McDonald & Co., Albany, N. Y.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.
Pittsburgh Meter Co., East Pittsburgh, Pa.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.

METER SEALS AND ADJUSTABLE CONNECTIONS
Lattimer-Stevens Co., The, Columbus, O.

METER SHELF
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Lattimer-Stevens Co., The, Columbus, O.

OFFICE LABOR SAVING DEVICES
Addressograph Co., Chicago, Ill.
Elliott-Fisher Co., Harrisburg, Pa.
Kalamazoo Loose-Leaf Binder Co., Kalamazoo, Mich.
Library Bureau, Boston, Mass.
Remington Typewriter Co., 374 Broadway, New York, N. Y.
Underwood Typewriter Co., 30 Vesey St., New York, N. Y.

OIL (Diaphragm)
John J. Griffin & Co., 1513 Race St., Philadelphia, Pa.
Superior Meter Co., Bush Terminal Bldg., Brooklyn, N. Y.

OVENS (Baking and Cooking)
G. S. Blodgett Co., The, Burlington, Vt.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York N. Y.
Crandall-Pettee Co., The, 150 Franklin St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
Elgin Stove & Oven Co., Elgin, Ill.
Fuller-Warren Co., The, Milwaukee, Wis.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
Ohio State Stove & Mfg. Co., The, Columbus, Ohio.
E. E. Steiner & Co., Inc., 20 Orange St., Newark, N. J.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.
Union Steel Products Co., Ltd., The, Albion. Mich.
Wheeling Corrugating Co., Wheeling, W. Va.

OVENS (Annealing, Japanning, Drying, Core, etc.)
American Gas Furnace Co. Elizabeth, N. J.
Elgin Stove & Oven Co., Elgin, Ill.
Gehnrich Indirect Heat Oven Co., Inc., Long Island City, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Grinnell Co., Inc. Providence, R. I.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Johnson Gas Appliance Co., Cedar Rapids, Iowa
C. M. Kemp Mfg. Co., The, Baltimore, Md.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
E. E. Steiner & Co., Inc., 20 Orange St., Newark, N. J.
Surface Combustion Co., The, 366 Gerard Ave., Bronx, N. Y.
Union Steel Products Co., The, Ltd., Albion, Mich.
Wheeling Corrugating Co., Wheeling, W. Va.
Young Bros. Co., Detroit, Mich.

OVENS (Warming)
G. S. Blodgett Co., The, Burlington, Vt.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eclipse Gas Stove Co., Rockford, Ill.
Elgin Stove & Oven Co., Elgin, Ill.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Meek Oven Mfg. Co., 18 W. 34th St., New York, N. Y.
Union Steel Products, Co., Ltd., The, Albion, Mich.
Wheeling Corrugating Co., Wheeling, W. Va.

PACKINGS (Rods, Plunger, Piston and Flange)
Johns-Manville, Inc., Madison Ave., and 41st St., New York, N. Y.

PAINT (Outside Steel Work)
Johns-Manville, Inc., Madison Ave. & 41st St., New York, N. Y.

PHOTOMETERS
American Meter Co., Inc., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Maryland Meter Works, Baltimore, Md.
D. McDonald & Co., Albany, N. Y.
Nathaniel Tufts Meter Works, 455 Commercial St., Boston, Mass.

PIPE
Bartlett Hayward Co. The, Baltimore, Md.
Davis & Farnum Mfg. Co., Waltham, Mass.
Grinnell Co., Inc., Providence, R. I.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Riter-Conley Co., Pittsburg, Pa.
Steere Engineering Co., Detroit, Mich.
United Lead Co., 111 Broadway, New York, N. Y.

PIPE CASTINGS AND SPECIALS
Banner Iron Works, 4560 Shaw Ave., St. Louis, Mo.
Bartlett Hayward Co. The, Baltimore, Md.
Davis & Farnum Mfg. Co., Waltham, Mass.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Isbell-Porter Co. Newark, N. J.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Stacey Manufacturing Co., The, Cincinnati, Ohio
Western Gas Construction Co., The, Fort Wayne, Ind.

PIPE CLAMPS AND SLEEVES
Davis & Farnum Mfg. Co., Waltham, Mass.
S. R. Dresser Mfg. Co., Bradford, Pa.
National Machine Works, Sheffield & North Aves., Chicago, Ill.

PIPE PACKING
Celite Products Co., 11 Broadway New York, N. Y.
Grinnell Co., Inc., Providence, R. I.
Johns-Manville, Inc., Madison Ave. & 41st St., New York, N. Y.
United Lead Co., 111 Broadway, New York, N. Y.

PIPE TOOLS (Caulking, Cutting, Tapping)
Grinnell Co., Inc., Providence, R. I.
H. Mueller Mfg. Co., New York, N. Y., Decatur, Ill.
Safety Gas Main Stopper Co., 943 Fulton St., Brooklyn, N. Y.
United Lead Co., 111 Broadway, New York, N. Y.

PLATE WARMERS
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Duparquet, Huot & Moneuse Co., 108 W. 22d St., New York, N. Y.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn N. Y.
Geo. D. Roper Corp., Rockford, Ill.

PORCELAIN ENAMEL PARTS (Stoves, Lamps, Linings, Stamping and Spinnings)
Baltimore Enamel & Novelty Co., Baltimore, Md.
Chicago Vitreous Enamel Product Co., 1407 So. 55th Court, Cicero, Ill.
Eclipse Gas Stove Co., Rockford, Ill.
Enamel Products Co., The, Cleveland, Ohio
Porcelain Enamel & Mfg. Co., The, Baltimore, Md.
Union Steel Products Co., Ltd., The, Albion, Mich.

PORCELAIN ENAMEL PLANTS (Installers)
Porcelain Enamel & Mfg. Co., The, Baltimore, Md.

PRESSURE GAUGES
American Meter Co., Inc., New York, N. Y.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bryant Heater & Mfg. Co., The, Cleveland, Ohio
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Equitable Meter Co., Pittsburgh, Pa.
Foxboro Co., Inc., The, Foxboro, Mass.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
Maryland Meter Works, Baltimore, Md.
D. McDonald Co., Albany, N. Y.
Nathaniel Tufts Meter Works, 455 Connecticut St., Boston, Mass.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Schaeffer & Budenberg Mfg. Co., The, Brooklyn, N. Y.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Taylor Instrument Cos., Rochester, N. Y.
Western Gas Construction Co., The, Fort Wayne, Ind.

PRESSURE GAUGES (Boiler, Naphtha, Oil, Steam Tar)
M. T. Davidson Co., 154 Nassau St., New York, N. Y.

PUMPS
American Gas Construction Co., Newton, Ia.
Connersville Blower Co., The, Connersville, Ind.
M. T. Davidson Co., 154 Nassau St., New York, N. Y.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Nathaniel Tufts Meter Works, 455 Commercial St., Boston Mass.
Geo. D. Roper Corp., Rockford, Ill.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Western Gas Construction Co., The, Fort Wayne, Ind.

PURIFIERS
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co. The, Baltimore, Md.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Cruse-Kemper Co., Ambler, Pa.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Cleveland, Ohio
Improved Equipment Co., The, 24 State St., New York, N. Y.
Isbell-Porter Co. Newark, N. J.
Riter-Conley Co., Pittsburg, Pa.
Russell Engineering Co., St. Louis Mo.
Stacey Bros. Gas Construction Co., The, Cincinnati, Ohio
Stacey Manufacturing Co., The, Cincinnati, Ohio
Steere Engineering Co., Detroit, Mich.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

PURIFIER BOX PACKING
John-Manville, Inc., Madison Ave. & 41st St., New York, N. Y.

PURIFYING MATERIALS
Alpha-Lux Co., Inc., 192 Front St., New York, N. Y.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Purifying Materials Co., Long Island City, N. Y.
J. F. Henderson Co., 1707 Commonwealth Bldg., Pittsburgh, Pa.
Iron Hydroxide Co., Paschall Station, Philadelphia, Pa.
Iron Oxide Products, Inc., 1301 S. 55th Court, Cicero, Ill.
Eph Lyon, Trust Company Bldg., Franklin, Pa.

PYROMETERS (Indicating and recording)
Foxboro Co., Inc., The, Foxboro, Mass.
Taylor Instrument Cos., Rochester, N. Y.

RADIANT HEATERS
General Gas Light Co., New York, N. Y., Kalamazoo, Mich.
J. H. Grayson Mfg. Co., The, Athens, Ohio
Kennedy-Toombs, Inc., 126 Eleventh Ave., New York, N. Y.
Roberts andMander Stove Co., Philadelphia, Pa.
Welsbach Co., Gloucester, N. J.

RADIANTS AND BACK WALLS
Gem Clay Forming Co., The, Sebring, O.

RADIATORS
American Gas Appliance Co., 108 Lawrence St., Brooklyn, N. Y.
Buffalo Gas Steam Radiator Co., Gowanda, N. Y.
James B. Clow & Sons, Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Eriez Stove & Mfg. Co., Erie, Pa.
Grinnell Co., Inc., Providence, R. I.
Hugo Manufacturing Co., West Duluth, Minn.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Kidde & Co., 103 Park Ave., New York, N. Y.
J. B. Slattery & Bro., Inc., 108-110 Lawrence St., Brooklyn, N. Y.
Williams Radiator Co., St. Louis, Mo.
A. H. Wolff Gas Radiator Co., The, 4 Great Jones St., New York, N. Y.

RANGES (Domestic)
A-B Stove Co., Battle Creek, Mich.
American Range & Foundry Co., Minneapolis, Minn.
American Stove Co., St. Louis, Mo.
Baltimore Gas Appliance & Mfg. Co., The, Baltimore, Md.
Bartlett & Co., Inc., Philadelphia, Pa.
Brunner Stove Co., 438 W. 164th St., New York City.
Century Stove & Mfg. Co., Johnstown, Pa.
Chambers Manufacturing Co., Shelbyville, Ind.
Geo. M. Clark & Co., Chicago, Ill.
Cleveland Co-Operative Stove Co., The Cleveland, Ohio
Comstock-Castle Stove Co., Quincy, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32nd St., New York, N. Y.
Cribben & Sexton Co., Chicago, Ill.
Crown Stove Works, Chicago, Ill.
Dangler Stove Co. Div., Cleveland, O.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co. Div., Rockford, Ill.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., The, Hamilton, O.
Fuller-Warren Co., The, Milwaukee, Wis.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Home Stove & Foundry Co. Chicago, Ill.
Howard Stove Co., Beaver Falls, Pa.
Malleable Iron Range Co., Beaver Dam, Wis.
Michigan Stove Co., The, Detroit, Mich.
National Stove Co. Div., Lorain, O.
New Process Stove Co. Div., Cleveland, O.
Ohio State Stove & Mfg. Co., Columbus, O.
Peerless Mfg. Co., The, Louisville, Ky.
Peninsular Stove Co., The, Detroit, Mich.
Philadelphia Stove Co., Philadelphia, Pa.
Quick Meal Stove Co. Div., St. Louis, Mo.
Rathbone, Sard & Co., Albany, N. Y., Aurora, Ill.
Reliable Stove Co. Div., Cleveland, O.
Roberts & Mander Stove Co., Philadelphia, Pa.
Scott Gas Appliance Co. Inc., Bond Bldg., Washington, D. C.
S. B. Sexton Stove & Mfg. Co., The, Baltimore Md.
J. M. Sherwood Co., 154 Chambers St., New York, N. Y.
Tappan Stove Co., The, Mansfield, Ohio.
Trenkamp Stove & Mfg. Co., The, Cleveland, O.
Union Stove Works, 70 Beekman St., New York, N. Y.
Vesta Gas Range & Mfg. Co., Chattanooga, Tenn.
Walker & Pratt Mfg. Co., Boston, Mass.
Weir Stove Co., Taunton, Mass.
Wheeling Corrugating Co., Wheeling, W. Va.
A. H. Wolff Gas Radiator Co., The, New York, N. Y.

RANGES (Hotel)
American Stove Co., St. Louis, Mo.
Baltimore Gas Appliance & Mfg. Co., The, Baltimore, Md.
Geo. M. Clark & Co. Div., Chicago, Ill.
Comstock-Castle Stove Co., Quincy, Ill.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32nd St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Duparquet, Huot & Moneuse Co., 108 W. 32nd St., New York, N. Y.
Eclipse Gas Stove Co. Div, Rockford, Ill.
Estate Stove Co., The, Hamilton, O.
Fuller-Warren Co., The, Milwaukee, Wis.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Michigan Stove Co., The, Detroit, Mich.
Roberts & Mander Stove Co., Philadelphia, Pa.
S. B. Sexton Stove & Mfg. Co., The, Baltimore, Md.

REFRACTORY MATERIALS
J. H. Gautier & Co., Jersey City, N. J.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Improved Equipment Co., The, 24 State St., New York, N. Y.
Johns-Manville Inc., Madison Ave & 41st St., New York, N. Y.
Missouri Fire Brick Co., St. Louis, Mo.
Monarch Engineering & Mfg. Co., American Bldg., Baltimore, Md.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York, N. Y.
Riter-Conley Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
G. F. Schmidt, Chicago, Ill.
United States Refractories Corp., Mount Union, Pa.

REGULATORS (Governors)
American Gas Construction Co., Newton, Ia.
Chaplin-Fulton Mfg. Co., The, Pittsburgh, Pa.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Connersville Blower Co., The, Connersville, Ind.
Equitable Meter Co., Pittsburgh, Pa.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Equipment Co., The, 24 State St., New York, N. Y.
Isbell-Porter Co., Newark, N. J.
H. Mueller Mfg. Co., New York, N. Y., Decatur, Ill.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Reynolds Gas Regulator Co., Anderson, Ind.
Sprague Meter Co., The, Bridgeport, Conn.
Steere Engineering Co., Detroit, Mich.
Western Gas Construction Co., The, Fort Wayne, Ind.

REPAIRS (Gas Meters and Appliances)
Helme & McIlhenny, 17th and Clearfield Sts., Philadelphia, Pa.
Maryland Meter Works, Baltimore, Md.
Superior Meter Co., Bush Terminal Bldg., Brooklyn, N. Y.
Western Gas Construction Co., The, Fort Wayne, Ind.

RETORTS
Gas Machinery Co., Inc., The, Cleveland, Ohio
J. H. Gautier & Co., Jersey City, N. J.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Improved Equipment Co., The, 24 State St., New York, N. Y.
Missouri Fire Brick Co., St. Louis, Mo.
Parker-Russell Mining & Mfg. Co., The, St. Louis, Mo.
Riter-Conley Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
West Gas Improvement Co. of America, 150 Nassau St., New York, N. Y.

ROOFING
Johns-Manville, Inc., Madison Ave., and 41st St., New York, N. Y.

ROOF CEMENTS
Johns-Manville, Inc., Madison Ave. and 41st St., New York, N. Y.

RUST PREVENTIVE
Superior Laboratories, Grand Rapids, Mich.

SAFETY DEVICES (Gas Masks, Oxygen Breathing Apparatus, etc.)
Mine Safety Appliances Co., Pittsburgh, Pa.

SCRUBBERS
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
Davis & Farnum Mfg. Co., Waltham, Mass.
Foundation Oven Corp., Woolworth Bldg., New York, N. Y.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Improved Equipment Co., The, 24 State St., New York, N. Y.
Isbell-Porter Co., Newark, N. J.
Koppers Co., The, Pittsburgh, Pa.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Riter-Conley Co., Pittsburgh, Pa.
Russell Engineering Co., St. Louis, Mo.
Stacey Bros. Gas Construction Co., The, Cincinnati, O.
Stacey Manufacturing Co., The, Cincinnati, O.
Steere Engineering Co., Detroit, Mich.
U. G. I. Contracting Co., The, Broad & Arch Sts., Philadelphia, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

SELLING AGENTS
J. M. Sherwood Co., 154 Chambers St., New York, N. Y.
Kidde & Co., 103 Park Ave., New York, N. Y.

SERVICE BOXES, CLAMPS, Etc.
Davis & Farnum Mfg. Co., Waltham, Mass.
Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Inc., Erie, Pa.
H. Mueller Mfg. Co., New York, N. Y., Decatur, Ill.

SERVICE VALVES (Gate Valves)
Ludlow Valve Mfg. Co., The, Ft. Adams St., Troy, N. Y.

SPECIALS—CAST IRON
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Western Gas Construction Co., The, Fort Wayne, Ind.

STEAM TRAPS
Johns-Manville Inc., Madison Ave. & 41st St., New York, N. Y.
B. F. Sturtevant Co., Inc., Boston, Mass.

STILLS (Benzol, Toluol)
Bartlett Hayward Co., The, Baltimore, Md.
Foundation Oven Corp., Woolworth Bldg., New York, N. Y.
Koppers Co., The, Pittsburgh, Pa.
Western Gas Construction Co., The, Fort Wayne, Ind.

STOPPERS (Gas Main)
Safety Gas Main Stopper Co., 943 Fulton St., Brooklyn, N. Y.

STOVES (Confectioners, Laundry, Tailor)
American Stove Co., St. Louis, Mo.
A-B Stove Co., Battle Creek, Mich.
Geo. M. Clark & Co. Div., Chicago, Ill.
Wm. M. Crane Co., 16 W. 32d St., New York, N. Y.
Elgin Stove & Oven Co., Elgin, Ill.
Fuller-Warren Co., The, Milwaukee, Wis.
General Gas Appliance Co., The, 103 Park Ave., New York, N. Y.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Geo. D. Roper, Corp., Rockford, Ill.

STRUCTURAL STEEL WORKS (See Holders)

TANKS (Ammonia, Oil, Water)
American Gas Construction Co., Newton, Ia.
Bartlett Hayward Co., The, Baltimore, Md.
Cruse-Kemper Co., Ambler, Pa.
Davis & Farnum Mfg. Co., Waltham, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Metcalfe-Shaw Corp., 1304 Flatbush Ave., Brooklyn, N. Y.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Riter-Conley Co., Pittsburgh, Pa.
Stacey Bros. Gas Construction Co., The, Cincinnati, O.
Stacey Manufacturing Co., The, Cincinnati, O.
Steere Engineering Co., Detroit, Mich.
Western Gas Construction Co., The, Fort Wayne, Ind.

TAR DEHYDRATION
Metcalfe-Shaw Corp., 1304 Flatbush Ave., Brooklyn, N. Y.
Sharples Specialty Co., The, New York, N. Y.

THERMOMETERS
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Elgin Stove & Oven Co., Elgin, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Gas Engineering Co., Ingram Ave., Trenton, N. J.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Superior Meter Co., Bush Terminal, Brooklyn, N. Y.
Taylor Instrument Cos., Rochester, N. Y.
Schaeffer & Budenberg Mfg. Co., The, Brooklyn, N. Y.
Western Gas Construction Co., The, Fort Wayne, Ind.

THERMOSTATS
Bryant Heater & Mfg. Co., The, Cleveland, Ohio
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Kidde & Co., 103 Park Ave., New York, N. Y.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
B. Ryan & Co., 372 W. 15th St., New York, N. Y.
Van Zandt Gas Appliance Co., 4050 Olive St., St. Louis, Mo.
H. A. Wilson Co., The, 97 Chestnut St., Newark, N. J.

THERMO VALVES
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Pittsburg Water Heater Co., Pittsburgh, Pa.
Robertshaw Mfg. Co., Youngwood, Pa.
H. A. Wilson Co., The, 97 Chestnut St., Newark, N. J.

THORIUM
Welsbach Co., Gloucester, N. J.

TRENCH WORK
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Safety Gas Main Stopper Co., 943 Fulton St., Brooklyn, N. Y.

TURBINE (Steam)
L. J. Wing Mfg. Co., 362 West 13th St., New York, N. Y.
B. F. Sturtevant Co., Inc., Boston, Mass.

VALVES
Aws Mfg. Co., The, 398 Harman St., Brooklyn, N. Y.
Bartlett Hayward Co., The, Baltimore, Md.
Bryant Heater & Mfg. Co., The, Cleveland, O.
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Connelly Iron Sponge & Governor Co., 227 Fulton St., New York, N. Y.
Gas Machinery Co., Inc., The, Cleveland, Ohio
Grinnell Co., Inc., Providence, R. I.
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Improved Equipment Co., The, 24 State St., New York, N. Y.

Isbell-Porter Co., Newark, N. J.
Ludlow Valve Mfg. Co., The, Troy, N. Y.
National Machine Works, Sheffield & North Aves., Chicago, Ill.
Stacey Manufacturing Co., The, Cincinnati, O.
Steere Engineering Co., Detroit, Mich.
Western Gas Construction Co., The, Fort Wayne, Ind.

VALVES (Needle Valves for Gas Stoves)
Acme Brass Works, Detroit, Mich.
Claus Automatic Gas Cock Co., Milwaukee, Wis.
Detroit Brass & Malleable Works, Detroit, Mich.
Peninsular Brass Works, Detroit, Mich.
McRae & Roberts Co., The, Detroit, Mich.
Roberts Brass Mfg. Co., The, Detroit, Mich.

WASHING MACHINES
Detroit Washing Machine Corp., Detroit, Mich.
"1900" Washer Co., The, Binghamton, N. Y.

WATER HEATERS
A-B Stove Co., Battle Creek, Mich.
Baltimore Gas Appliance & Mfg. Co., The, Baltimore, Md.
Bartlett & Co., Inc., Philadelphia, Pa.
Bastin-Morley Co., La Porte, Ind.
Bryant Heater & Mfg. Co., The, Cleveland, O.
Geo. M. Clark & Co., Div., Chicago, Ill.
Cleveland Heater Co., The, Cleveland, O.
Abram Cox Stove Co., Philadelphia, Pa.
Wm. M. Crane Co., 16 W. 32nd. St., New York, N. Y.
Detroit Stove Works, Detroit, Mich.
Eclipse Gas Stove Co., Rockford, Ill.
Elliott Water Heater Co., Inc., Brooklyn, N. Y.
Estate Stove Co., Hamilton, O.
General Gas Appliance Co., 103 Park Ave., New York, N. Y.
Hoffman Heater Co., The, Lorain, O.
Humphrey Co., Div., Kalamazoo, Mich.
Kidde & Co., 103 Park Ave., New York, N. Y.
Kompak Company, The, New Brunswick, N. J.
Lawson Mfg. Co., Pittsburgh, Pa.
Lovekin Water Heater Co., The, 39 Laurel St., Philadelphia, Pa.
Michigan Stove Co., The, Detroit, Mich.
New Process Stove Co., Div., Cleveland, O.
Peninsular Stove Co., Detroit, Mich.
Philadelphia Stove Co., Philadelphia, Pa.
Pittsburg Water Heater Co., Pittsburgh, Pa.
Rathbone, Sard & Co., Albany, N. Y., Aurora, Ill.
Reliable Stove Co., Div., Cleveland, O.
B. Ryan & Co., 372 W. 15th St., New York, N. Y.
Ruud Mfg. Co., Pittsburgh, Pa.
Sands Mfg. Co., The, Cleveland, O.
Trenkamp Stove & Mfg. Co., The, Cleveland, O.
Van Zandt Gas Appliance Co., 4050 Olive St., St. Louis, Mo.
Wales Co., The, Kalamazoo, Mich.

WATER SOFTENERS
Refinite Co., Inc., The, Omaha, Neb.

WATER STILLS (Gas Heated)
Improved Appliance Co., The, 419 Kent Ave., Brooklyn, N. Y.
Young Bros. Co., Detroit, Mich.

WELDED STEEL PIPE
Bartlett Hayward Co., The, Baltimore, Md.
Steere Engineering Co., Detroit, Mich.
Western Gas Construction Co., The, Fort Wayne, Ind.

WELDING
American Gas Furnace Co., Elizabeth, N. J.
S O S Welding Corp., 235 Sixth St., Brooklyn, N. Y.

(Continued from page 340)

previously sent them should approve same for payment and these should also be entered in the General Cost Records.

The Cost Department should keep a detailed record of all money expended on each contract in individual cost ledgers according to the sub-accounts which are affected by such expenditures, the aggregate of which should be controlled by the General Ledger balances at the end of each month.

Work performed by the contractor and not covered by the specifications and contract is usually designated as Extra Work.

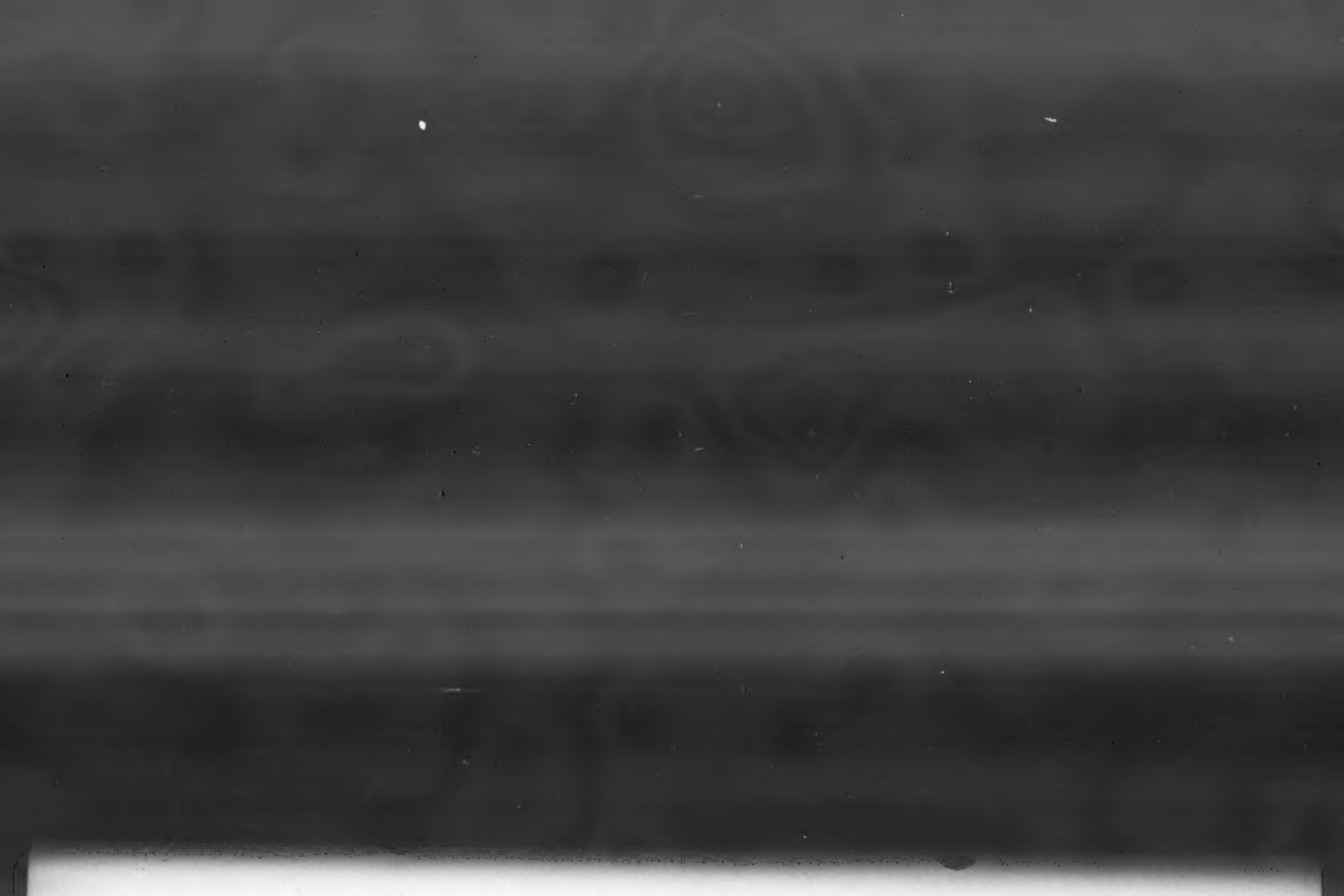
This work should be covered by a number corresponding to the contract number assigned to this work followed by an "X" and a sequence of numbers starting with one (1) and changing for each additional piece of work so performed.

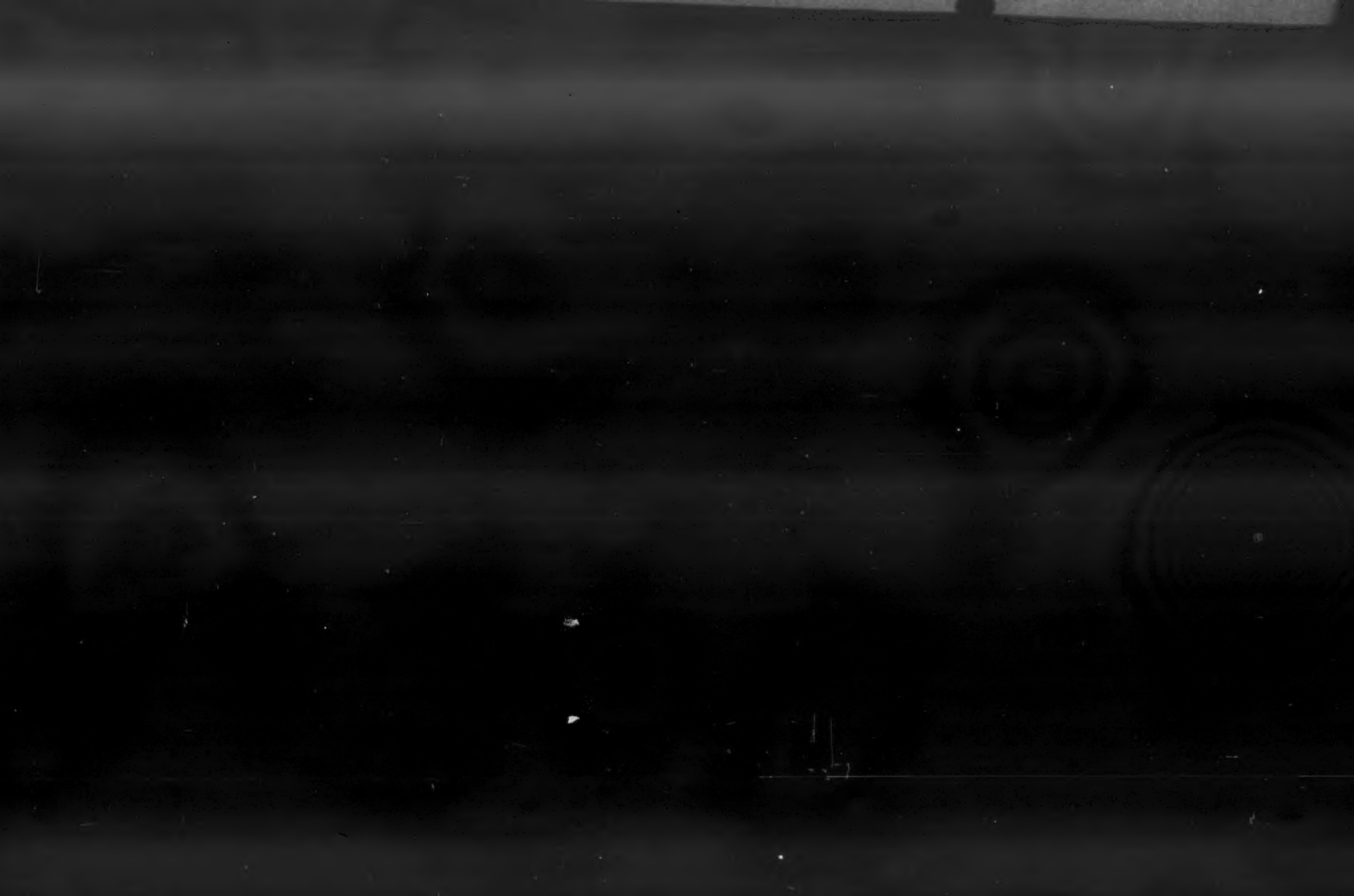
Field receipts should be sent in daily. These should show the number of hours of each class of labor at the prevailing rate per hour and also material used on the work.

These receipts should be approved, both by the representative of the customer and the Erecting Engineer.

The aggregate charges for a given period should be the same amount as shown on the payroll distribution report charged to this account.

From the foregoing, it will be seen that in addition to providing for proper segregation of construction cost into the various accounts, there will be also maintained a continuous check on the expenditures from the origin of the first purchase order and the initial payment on account of labor, until the completion of the contract and final settlement of all obligations in connection therewith.





Employment Bureau

Today there is a pronounced and growing demand for high grade sales executives who can not only profitably merchandise the gas company's product, but who are also capable of handling the public relations of the company.

With the increasing tendency to actively push the merchandising of gas appliances so evident throughout the industry, there is springing up a greater demand for broad gauged and experienced men to fill important positions in gas companies.

The Association will act as a clearing house, and, without charge to its members, assist companies in getting in touch with individuals who are seeking new connections.

All inquiries from companies or applications from individuals should be directed to Association headquarters and will be treated as strictly confidential.

SERVICES REQUIRED

WANTED—Fitter who can do good work on installation of water heaters, ranges and who thoroughly understands Gas Company appliance work. Address A. G. A.
Key No. 01.

HIGH GRADE Industrial Sales Engineer wanted. Must be man having had factory experience and knowledge of house heating. Gas company in middle west has need of such a man and requests applicants to give full particulars of experience. Appointment for interview will be arranged. Address American Gas Association.
Key No. 0-3.

MANAGER WANTED—for small, water gas plant within 300 miles of New York. Applicant must be familiar with manufacturing dirtribution and commercial functions and possesses a personality that would be pleasing to the public. State age, previous experience, salary wanted, and all other pertinent facts. Address A. G. A.
Key No. 05.

SERVICES OFFERED

WANTED—Position by a man of large general experience in gas business who has made a special study of sales promotion problems, and who would prove valuable as an assistant to a busy executive in any department. Address A. G. A.
Key No. 134.

GAS APPLIANCE SALESMAN—Especially trained in water and house heating; 15 years' experience; desires selling position, either road or local, with aggressive appliance manufacturer or gas company. Will furnish best selling references. Drawing account against commission. Address A. G. A.
Key No. 125.

WANTED—A young man with some experience in the manufacture and distribution of gas, as an Industrial Fuel Engineer in Sales Department of an eastern gas company. One who is qualified to work up various industrial fuel problems and make good in this end of the business is assured of proper advancement. Address A. G. A.
Key No. 04.

WANTED—Position as executive in a local office of a gas or a combination gas and electric company. Have had a practical experience in all branches of commercial utility work. Have been successful in dealing with the public and promoting good will of utility companies. Educated in commercial and accounting methods as compiled by N. C. G. A. and N. E. L. A. Well acquainted in office routine and very exact on details and execution of same. Address A. G. A.
Key No. 114.

ENGINEER—Producing results in operating desires to make change, either as Engineer or Assistant Engineer of Works with output over 20,000,000 daily output. Or in Managing capacity. Address A. G. A.
Key No. 135.

WANTED—Man of wide executive experience in gas accounting, statistics and system and a record of success in gas appliance merchandising, is now, after illness of several years, prepared to sacrifice in size of salary if necessary to obtain exactly the sort of position he is looking for. Inquiries solicited. Address A. G. A.
Key No. 141.

INDUSTRIAL FUEL ENGINEER—Knowing heat treatment as applied to general industrial problems, house heating, hot water storage, and who knows the construction, operation and proper installation of every appliance he handles. Who has sold himself "Gas" as The heat treating medium, who has excellent "business getting" and executive abilities, would like to change to corporation where his abilities can be better utilized. Address A. G. A.
Key No. 139.

POSITION WANTED—Technical graduate with some experience in all branches of combination, manufactured, and natural gas companies, but particularly as head of industrial and new business departments, desires responsible position with a future. Address A. G. A.
Key No. 140.

AMERICAN GAS ASSOCIATION, INC.

HEADQUARTERS 130 EAST 15TH ST., NEW YORK, N. Y.

Officers and Directors

PRESIDENT	DANA D. BARNUM	Boston, Mass.
VICE-PRESIDENT	R. S. BROWN	Milwaukee, Wis.
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SECTIONAL VICE-PRES	A. P. POST	Philadelphia, Pa.
SECTIONAL VICE-PRES	J. S. DuHART	Newark, N. J.
SECTIONAL VICE-PRES	E. HAASE	Milwaukee, Wis.
SECTIONAL VICE-PRES	A. A. HIGGINS	Providence, R. I.

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SAMUEL T. BODINE	Philadelphia, Pa.
R. C. CONGDON	Atlanta, Ga.
MARTIN B. DALY	Cleveland, Ohio.
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HENRY L. DOHERTY	New York, N. Y.
L. R. DUTTON	Jenkintown, Pa.
W. G. GRIBBEL	Philadelphia, Pa.
ARTHUR HEWITT	Toronto, Can.
C. L. HOLMAN	St. Louis, Mo.
J. B. KLUMPP	Philadelphia, Pa.
F. H. KNAPP	Pittsburgh, Pa.
A. B. MACBETH	Los Angeles, Cal.
THOMAS N. McCARTER	Newark, N. J.
EMERSON McMILLIN	New York, N. Y.
GEORGE D. ROPER	Rockford, Ill.

Section Officers

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ADVERTISING—Chairman	A. A. HIGGINS	Providence, R. I.
Vice-Chairman	B. J. MULLANEY	Chicago, Ill.
Secretary	C. W. PERSON	Ass'n Headqtrs.
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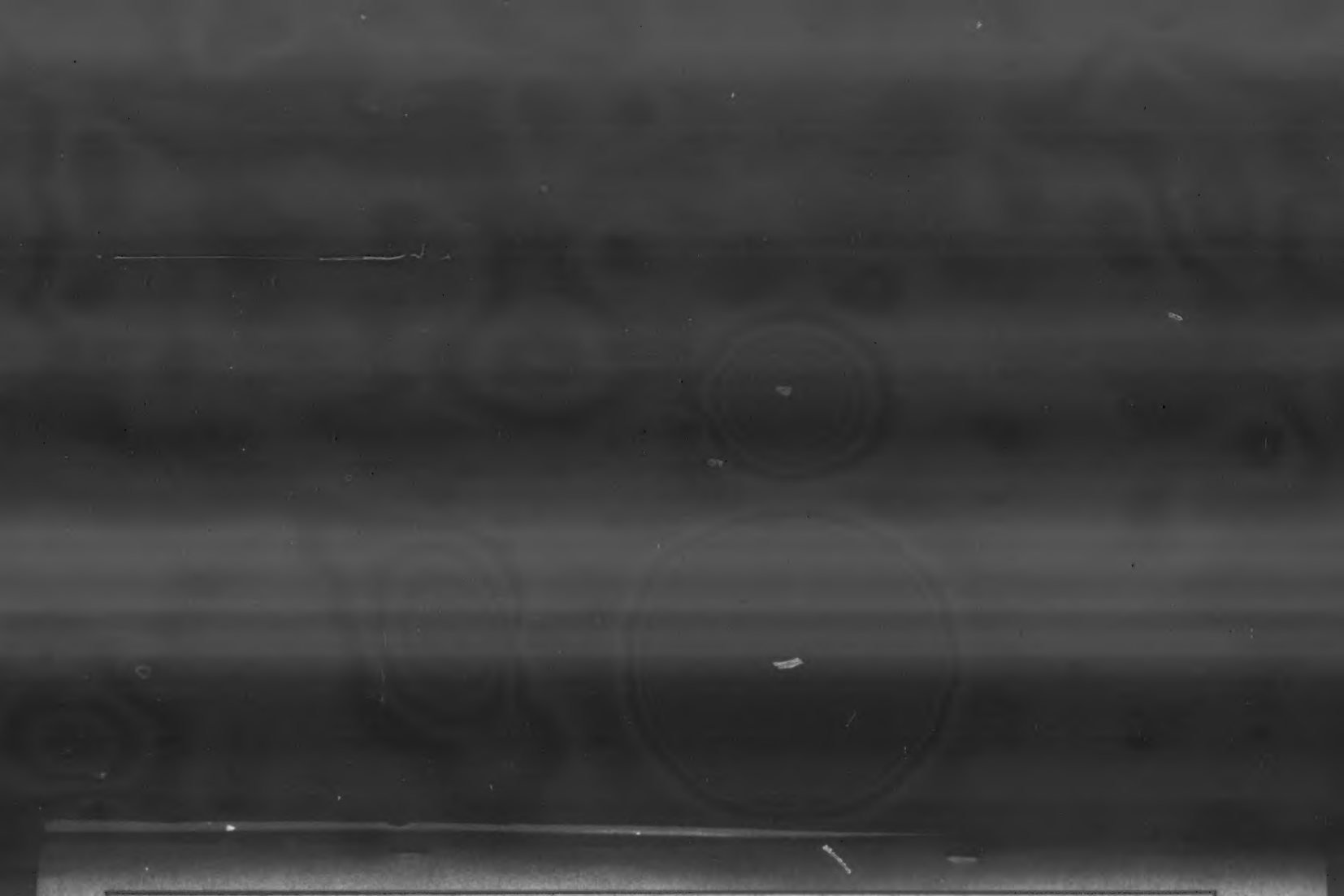
Vice-Chairman	Wm. GOULD	Boston, Mass.
Secretary	LOUIS STOTZ	Ass'n Headqtrs.
MANUFACTURERS—Chairman	J. S. DuHART	Newark, N. J.
Vice-Chairman	F. A. LEMKE	Kalamazoo, Mich.
Secretary	C. W. BERGHORN, Jr.	Ass'n Headqtrs.
TECHNICAL—Chairman	C. N. CHUBB	Davenport, Iowa
Vice-Chairman	F. C. WEBER	New York, N. Y.
Secretary	H. W. HARTMAN	Ass'n Headqtrs.

SECRETARY-MANAGER	OSCAR H. FOGG	Ass'n Headqtrs.
ASS'T SECRETARY-MANAGER	LOUIS STOTZ	Ass'n Headqtrs.
ASS'T TREASURER	W. CULLEN MORRIS	New York, N. Y.